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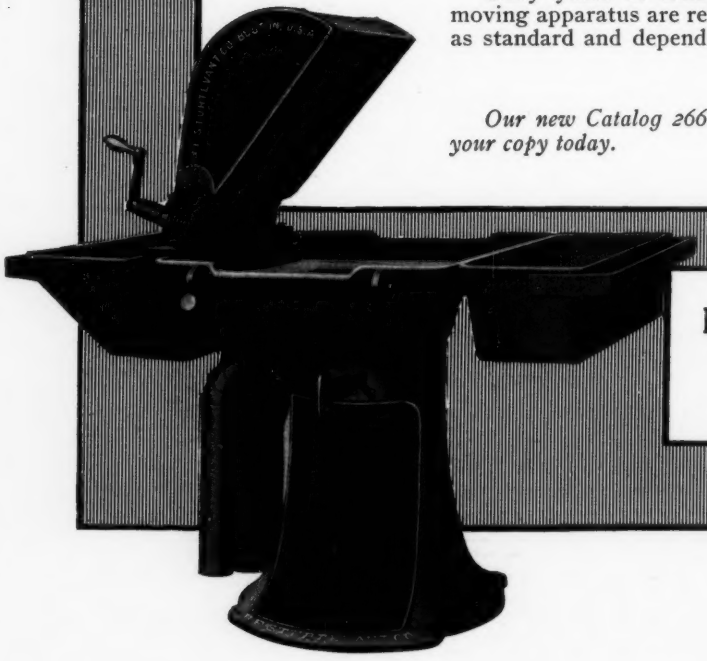

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INDUSTRIAL-ARTS MAGAZINE

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The Organization and Teaching of Industrial Subjects in a Part-time or Continuation School

Robert H. Rodgers

Specialist in Industrial Education and Teacher Training, New York State Education Department

I. Introduction to the Subject.

PART-TIME education is confronted with the immediate problem of demonstrating that it is a service program of training of direct worth and value to the individual and to the community. Demonstrating the worth of a movement is not accomplished by mere propaganda but it is the resultant of community understanding and appreciation and real accomplishment. The program of part-time education must provide for a movement in well defined directions. The material in these articles is presented from the standpoint of definite educational possibilities for the various age groups returning to the part-time schools. It has to do with organization of a plan of work that aims to produce results in terms of recognized individual betterment. It furthermore represents experiences developing from the inauguration of the part-time education movement in the State of New York.

The development of the entire subject is based on certain fundamental theses:

1. The children returning to part-time schools are wage earners in the vast majority of instances and are therefore more interested in instruction of an occupational character than in instruction of an academic nature.

2. That the period between 14 and 16 years in the young wage earner's life is one requiring guidance, counseling and experience that will function in an intelligent selection of an occupation.

3. Vocational experiences offered in specific occupations or groups of occupations within the part-time schools afford a most effective opportunity for vocational guidance.

4. Vocational activities well organized and taught in part-time classes will equip the pupils with a certain amount of skill in basic jobs and give an understanding of fundamental related technical facts.

5. Notwithstanding time limitations valuable instruction in fundamental jobs may be offered to students that is distinctly trade preparatory in character; profitable work may also be given in related technical subjects that is manifestly trade extension in nature.

II. The Significance of Occupational Facts for the Part-Time School Director and Teacher.

It is most trite to say that teachers and directors in the field of part-time education should know their communities. The amazing truth is, nevertheless, that many of them do not know what is happening outside the walls of the school buildings. The occupational distribution of juveniles and adults in the community, and the character of the different occupations and their desirability from the standpoint of adult or juvenile employment, is information of prime importance, with which the people in part-time education should be always familiar.

The occupational facts are available and it requires very little effort to organize them for use. The new United Stated Census will soon be ready. Chambers of Commerce usually have a certain amount of information and in states where an industrial commission or labor department is maintained much valuable information is obtainable. The records of the part-time pupils afford a wealth of occupational information about juvenile employments. The information on the personal records should be supplemented by the reports of those charged with the follow-up work. Every visit made to a place of employment should result, not only in securing the facts about an individual's work, but as much more information about the jobs in the entire plant as may be practical. A cumulative record of occupational information should be built up as early as possible. Key notes of a successful part-time program are: (1) secure the occupational facts in your community; (2) use the occupational facts intelligently.

An illustration of the value of this information is found in the brief study of the occupational distribution in the cities of Albany and Schenectady. Employment conditions have not materially changed in these two places during the past ten years so that the 1910 census gave very usable information on the adult employments. Table I indicates very specifically the general distribution.

TABLE I. GENERAL OCCUPATIONS OF TWO TYPE CITIES.

Occupations	Albany		Schenectady	
	Male	Female	Male	Female
All occupations	33344	12780	26438	5873
Agricultures, forestry, etc.	332	9	126	7
Manufacturing and mechanical	13059	4011	17020	2005
Transportation	5248	200	1630	82
Trade	5947	1132	2622	432
Public service	921	27	338	3
Professional service	1781	1261	1254	529
Domestic and personal service	2622	4381	1240	1699
Clerical	3419	1759	2133	1116

Table II which follows indicates the major skilled and semi-skilled occupations in the field of the mechanical and manufacturing pursuits.

TABLE II. MAJOR SKILLED TRADES.

TRADES	Albany			Schenectady		
	Male	Female	Total	Female	Male	Total
Bakers	293	29	322	101	7	108
Blacksmiths and forgers	262	0	262	333	0	333
Boiler makers	239	0	239	359	0	359
Brick and stone masons	352	0	352	205	0	205
Builders and building contractors	293	5	298	251	1	252
Carpenters	1209	0	1209	705	0	705
Compositors, linotypers, typesetters	458	18	476	124	19	143
Dressmakers and seamstresses	0	1163	1163	1	396	397
Engineers (stationary)	312	0	312	239	0	239
Machinists, toolmakers, millwrights	1004	0	1004	3934	0	3934
Molders, founders and casters	362	1	363	564	0	564
Milliners and millinery dealers	17	318	335	9	132	135
Painters, varnishers, etc	676	1	677	420	9	429
Pattern and model makers	31	4	35	242	1	243
Plumbers and gas and steam fitters	545	0	545	255	0	255
Sewers and sewing machine operators	29	708	737	2	111	113
Tailors and tailoresses	428	105	533	139	14	153
Tinsmiths and coppersmiths	99	1	100	102	0	102

The information disclosed by Table II should cause a supervisor or director to at least hesitate about equipping general woodworking shops for the part-time students.

Table III represents a study made of the 14 and 15 year old employed children attending part-time school in the two cities.

TABLE III. OCCUPATIONS FOLLOWED BY 14 AND 15 YEAR OLD CHIDREN.

Occupations	Albany		Schenectady	
	Number	Percent	Number	Percent
Sales clerk	13	5.0	29	6.0
Bundle wrappers	9	4.0	4	.5
Shipping clerks	6	2.5	8	2.0
Delivery boys	23	9.0	8	2.0
Messengers—office clerks.	88	28.0	200	43.0
Stenographers	2	1.0	3	.5
Newsboys	5	2.0	0	0
Bell boys	3	1.0	6	1.0
Telephone operators	1	.5	1	0
Domestic workers	17	7.0	53	11.0
Factory workers	112	40.0	70	15.0
Unclassified	0	0	86	19.0
Totals	279	100.0	468	100.0

Table III indicates very positively that children under 16 years of age are not in factories but are in juvenile occupations that present meager possibilities for promotion.

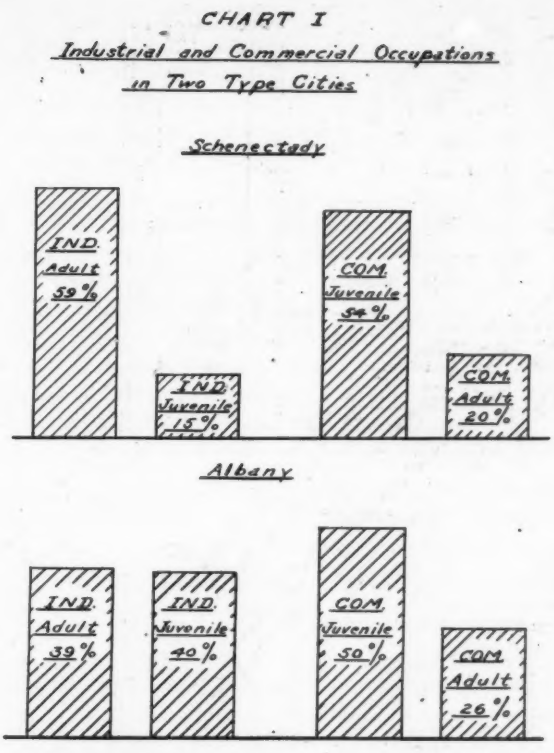
Chart I which follows shows graphically the adult and juvenile occupations and indicates an almost complete reversal on the part of the juveniles sometime after the sixteenth birthday. These facts should be very significant to any school administrator and result in an organization that will aid these young wage earners to make an intelligent transition.

The conclusions based on the foregoing chart and tables are: (1) juvenile employment is predominately in the commercial occupations; (2) adult employment is largely in the manufacturing and mechanical occupations; (3) the juvenile and adult distribution indicates a complete change of occupation on the part of many juveniles sometime after the sixteenth birthday; (4) the fact that many changes are made would seem to show that vocational guidance has a definite place in the part-time education program for the 14 and 15 year groups; (5) the major adult occupational groups are disclosed and should have a bearing on the organization of courses of instruction.

The illustration of the two type cities should indicate the value of occupational facts. A program of public education will never be permanently established unless based on the facts pertaining to the community. The use of hypotheses should be eliminated from the practises of a part-time school administrator. His doctrine should be (1) get the occupational facts of the community; (2) use the facts intelligently for educational purposes.

III. The Objectives of Industrial Subjects in the Part-time School.

A previous section endeavored to establish the importance and need of vocational activities within the part-time school. What are some of the definite things that should result from the inclusion of this work as a specific part of the part-time school? The brief statistical study very clearly called attention to the fact that the 14 and 15 year old children were not in permanent employments. It therefore follows that the major objective of the industrial subjects for those age groups may well be vocational guidance. The shops may be considered as industrial laboratories equipped with such tools, machines and material as will enable the prospective adult wage-earner to gain a very practical, common sense insight into the work of the specific occupation or group of occupations.



It also provides a form of educational activity for the young wage-earner that interests him because of its similarity to the activities with which he is surrounded in his daily work and the appeal which it makes to his native reactions. The shop, with its work as the source, will also provide for a great amount of instruction in mathematics, science, hygiene and safety, English, civics, history and industrial economics. In the shops organized for guidance purposes, the younger pupils will secure a certain amount of practical experience in the use of tools and materials on fundamental jobs, in a number of occupations. The trade preparatory group will undergo certain practical experiences in a specific trade while the trade extension group will profit by technical training related to their trade.

The objectives of the industrial subjects in the part-time school may then be thus summarized:

1. To provide a practical form of vocational guidance in specific occupations or groups of occupations.
2. To provide a virile form of educational activity that will appeal to and immediately serve the young wage-earners.
3. To utilize the industrial activities to vitalize the mathematics, science, hygiene and safety, English, civics, history and industrial economics.
4. To provide for the 14 and 15 year old groups a limited amount of practical experience in the use of tools, and materials on fundamental jobs in several occupations.
5. To provide for pupils who are preparing for specific occupations a certain amount of practical experience in that specific field; for the pupils who are wage-earners, in their chosen field, related technical experiences that will supplement their training on the job.

(To be continued)

Establishing an Automotive Course

Everett G. Glenn, South Side High School, Minneapolis

(Conclusion)

Cost of Permanent Equipment for Automotive Electricity Course

All material for an automotive electricity course should be purchased direct from the manufacturers in order to get the latest. Junk equipment in this line is worse than nothing, because the old equipment was very complicated and after learning all about it the student knows little of modern equipment. Manufacturers generally allow very liberal discounts to schools for their equipment when it is to be used for educational purposes, By ordering direct from them one will get the very latest machines at by far the lowest cost.

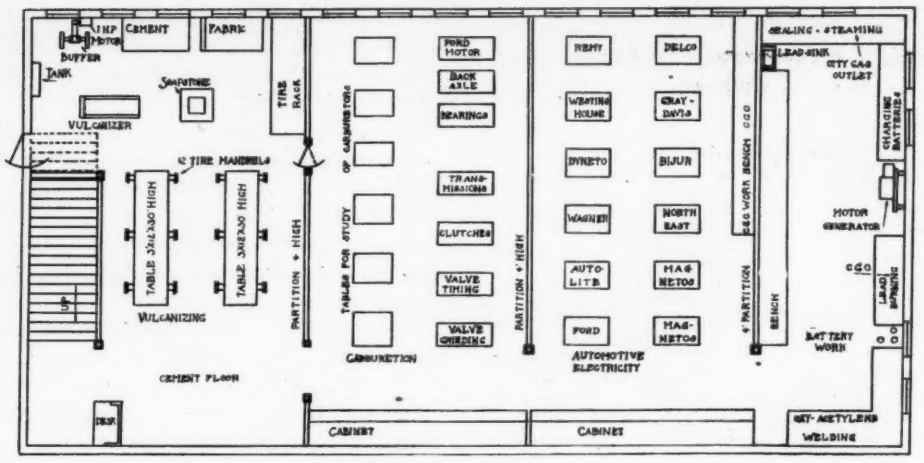
This equipment should be selected the same as in the case of the carburetors, by looking up the most popular systems in the statistical numbers of the automotive magazines. The complete systems will cost on an average fifty dollars each.

10 starting, lighting, and ignition systems	$ 500.00
4 high tension magnetos	80.00
— battery ignition systems (coils, breakers, etc.)	50.00
— electrical testing instruments	200.00
10 rheostats	150.00
10 ½ H. P. motors for driving the generators	400.00
1 motor-generator set for charging batteries, magnets, testing condensers, testing windings, etc.	250.00
— tables, benches, cabinets, etc	200.00
— installation	100.00
— services of practical man to make models etc.	150.00
— total cost of automotive electricity equipment (installed)	2080.00

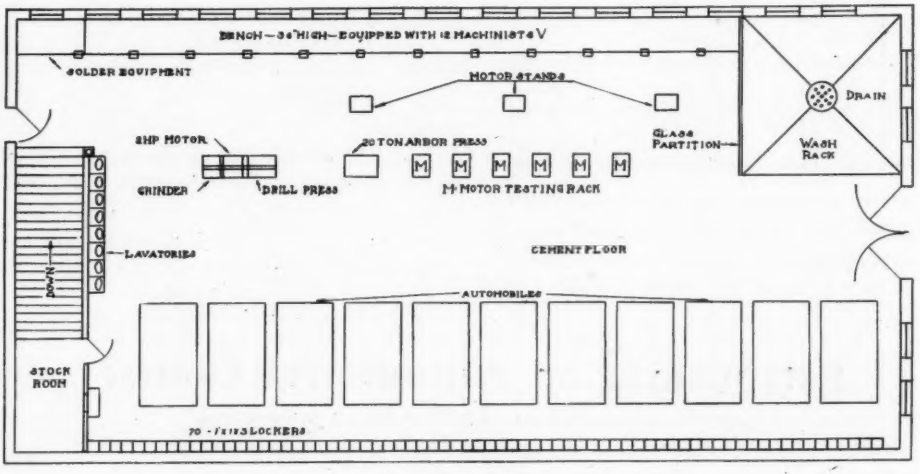
If direct current is available in the building there is no need for the motor-generator set. The item of rheostats and motors for driving the generators could be cut to five or less but this would necessitate the moving of the generators from their mountings and would tend to make somewhat of an upset condition of the room.

Unit Course in Oxy-Acetylene Welding.

Any automotive department or garage is not complete unless it contains an oxy-acetylene welding outfit. One never realizes how many things can be done with this until he has got used to one and then tries to do without it. A good and complete outfit can be purchased for $200. The profits from welding and



SECOND FLOOR PLAN
AUTOMOTIVE BUILDING
E.G. GLENN



FIRST FLOOR PLAN.

FLOOR PLANS FOR AUTOMOTIVE SCHOOL SHOP.

carbon burning are large and enough work can be taken in to pay for the outfit the first year. Teaching this as a class subject, trade or otherwise, is quite expensive and requires the entire time of one instructor. One or two boys of the regular high school classes should be taught how to weld and handle the outfit and may be allowed to attend to the jobs brought in as well as the work of the department. The business department of the Board of Education, if it does its own repairing, will furnish considerable work for the welding outfit. This is good for the boys and is the "missing link" which makes a complete automotive department.

However, if one wishes to install a department for teaching this work he should buy as many different makes of torches as there are students in the class. By use of manifolds, regulators and gauges are unnecessary. Torches cost about $30 each.

12 torches	$360.00
4 regulators	120.00
— misc. (bricks, welding tables, installation, etc.)	30.00
Total,	$510.00

Floor Plans.

Referring to the first floor plan of the automotive building shown here, cars can enter through the double doors shown at the right. By means of a dolly jack they can be parked as shown. When ready to begin work on a particular car, the machine can be pushed out in the open space where the engine can be loosened and removed to the engine racks or bench by the window, by means of either an overhead crane or portable crane. Here it can be washed and the electrical equipment and carburetor removed and sent up to their respective places. The electrical students will test, repair, and adjust all of the electrical equipment while the carburetor students will repair or test the carburetor.

Note the wash rack near the entrance and the glass partition to keep water from getting on the tools and work of those at the bench. The glass partition here gives more light to those who are washing the car and also corresponds with the policy to avoid all dark nooks and corners where the boys can congregate and get into trouble.

There are six motors permanently mounted on racks as shown on the drawings. When work is slack in the garage, these motors can be "doctored" by the instructor and the students put to work getting them to run. The instructor could remove the ignition systems on some, the carburetors on others, put dirt or water in the gasoline, etc. This gives the student good practice in actually "shooting trouble".

A twenty-ton arbor press is quite essential and is located in line with the motors as well as a grinder and a drill press. No lathes are shown or recommended. Now-a-days, parts can be bought much cheaper than they can be machined and as a result of this very few garages have or use lathes. If any machine work is necessary it is sent to the machine shop of the school. Under the stairs is ample room for tools and supplies. There should be a dozen large boxes provided with locks. These could be kept under the work bench and when a group of students is assigned a car they should put all of its parts in one of these boxes and keep it locked. This is quite important if one would avoid lost and mislaid parts. Lockers are placed along the wall behind the cars.

Note the door at the foot of the stairs, which leads into the main building. The stairs lead up to the second floor where the boy gets his preliminary work. The instructor's desk is placed in such a position that he can see all that is going on in the room and take note of who comes into or leaves the room. It will be noticed that the various divisions are partitioned off by railings which are only four feet high. These keep the student from wandering around the room and away from his work and makes it possible for the instructor to see what is going on all over the room.

The regular high school student is put through his course in lectures, then through the laboratory where he studies parts as shown, carburetors, and automotive electricity, whence he goes to the first floor and works on motors and finally on cars. Vulcanizing and battery work are not taught to the regular high school student unless he requests it in lieu of something else. These are used for trade classes and to make a complete automobile repair plant.

While there is considerable equipment herewith listed and shown on the plans, if any of it is eliminated it takes that much away from every boy who completes the course. Note that every boy will use and work with everything shown here, except in the vulcanizing, battery, and oxy-acetylene departments.

If this equipment is all in use at one time 116 students can easily be taken care of, apportioned as follows:

First floor	40
Vulcanizing	16
Carburetion	12
Engines, back axles, clutches, etc.	12
Automotive electricity	24
Battery work	10
Welding	2
Total students	116

The total cost of equipment as shown here is $5,174.95. This gives a cost of about $44. per pupil for permanent equipment and by proper management the department can be made to pay for its supplies and upkeep exclusive of instructors' salaries.

Instructors.

No instructor should be employed in this department who has not had practical experience in what he is teaching. The fact that a man has worked in a garage is no reason why he should be engaged to teach battery work unless he has had experience in battery work.

The head of the automotive department should be a man who has had some college work in both education and mechanical or electrical engineering and he should have had several years' experience in all phases of garage work. He should be a master workman, one who can do welding as well as battery work, or who can quickly locate any trouble in a car. He should be a member of the Society of Automotive Engineers and also a member of the local garage owners' association. If he owns or has a part interest in a garage it should be considered an asset to the school. He should be personally acquainted with the leading garage men of the town and should have their confidence. All of these qualifications tend to inspire confidence in this department by the community which will tend to keep it well filled with good students.

This man should be given entire charge of the department and held responsible for its work. He should be allowed to hire his assistants or instructors. These should be selected from the trade and encouraged to take some extension work in Industrial Education. He should do all the lecturing and lay out the courses. The lecture classes should be as large as possible and three men should be able to handle the work in the whole department, even if it is filled to its limit all day long. The head of the department, besides lecturing, should help with the work wherever he is needed. One instructor would have charge of the lower floor and another of the upper floor.

Every branch of work in the department should be organized with its student foreman and his assistants. Every student should have some responsibility,—some job for which he is held responsible. This is excellent training for the student and is best for the equipment.

Without organization along this line three instructors will be unable to handle the work if the department is filled to its capacity.

The student should be given a set of operations to perform in any course he may be taking and he should be checked by an instructor upon completion of each job. In short, the lecturer shows and tells the student how to do the various jobs of his course; the student then does these jobs and is checked by the instructors.

Manual training and technical teachers who wish to enter this field should first get some practical experience in a garage and by driving their own cars, and then they should get acquainted with those in the trade. They should read and study about the automobile and should use a good text in the classroom. There has been much discussion as to who makes the best instructor—the practical man or the teacher. However, there is little doubt that the man who has both is best.

The Smaller High Schools.

The establishment of an automotive course in the smaller high schools presents a special problem under special conditions and its success will depend upon the ingenuity and resourcefulness of the instructor concerned.

Careful study of this article should be of help but he will find his problem a different one than is here outlined for the city or technical high school.

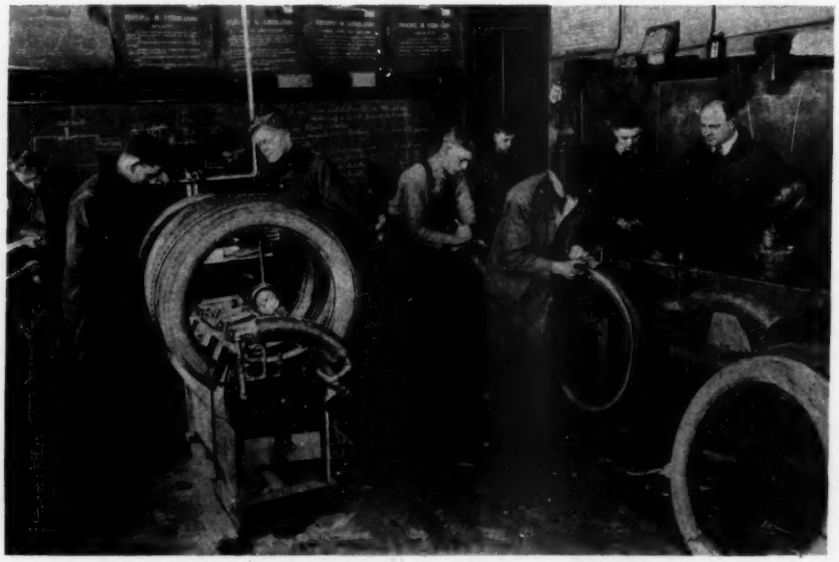
The aim in establishing such a course in the smaller high schools should be to make it part of the student's general education. No trade training should be attempted because, there would not be a legitimate demand for it from enough students; there would not be enough equipment; and it would hardly be probable that the instructor was a finished tradesman.

The one back of this course should begin by "borrowing" and buying (if he can get the money from his board) a few engines and parts, back axles, clutches, transmissions, carburetors, charts, etc. Above all things he should get his local garage men interested and they will "lend" him much equipment. The students themselves will be able to bring parts and even engines. Let them know how important they will be if they can bring something which can be used to study automobiles.

Besides the problem of getting equipment the instructor will be faced with another—that of getting a place to put it. Most small high schools are crowded for room and may not be built with fireproof construction. Either one of these conditions may mean that the work cannot be taught in the high school. This being the case, the next best thing is to rent quarters in some building near the school. The lecturing can be done in the school.

Another problem is that of getting this work in the curriculum of his school. Naturally it should come in the manual training or agriculture courses. If there is the equipment it could be profitably taught during the whole of the fourth year. Conditions may make it such that it could be taught but half the year. Automotive training requires the more mature class of students and is not very well adapted to first, second, or third year students.

Suppose the teacher has been able to get together a few engines, carburetors, and ignition systems. He could begin by giving his lectures on the chassis and parts, the engine, the carburetors, and ignition. True, the student will have forgotten some of the lectures on the clutch or axle while the instructor has been lecturing on the other parts but this is an unavoidable objection because there will not be enough equipment to lecture on one part and then go to the laboratory and



TIRE REPAIR SHOP IN THE SOUTH HIGH SCHOOL, MINNEAPOLIS.

AUTOMOTIVE REPAIR SHOP, SOUTH HIGH SCHOOL, MINNEAPOLIS, MINN.
Mr. E. G. Glenn, Director.

study that part, the ideal way. The lectures should be practical. They should consist of studying the various parts of the automobile as to their purpose, operation, care, and repair. The instructor should have these parts at hand and demonstrate their repair before the class. This makes the lecture plain and interesting to the student and will be a factor in holding the interest of the class.

After the lectures are all completed, which should take approximately a third of the time, the laboratory work could be begun. The instructor should make out a list of the common jobs that are done on a car, suiting these to his equipment, and then write up definite directions for doing these and paste them up near the equipment so that they are handy for the student while he is doing the job. A sample of these would be as follows:

Clutches.

Clutches.
- Study their operation and explain it.
- Make adjustment of each one.
- Learn their troubles and remedies by reference reading.

Back axles.
Assemble a spring.
Clean carbon and grind valves.
Adjust valve clearance.
Time valves,—by means of marks on the gears, by means of marks on the flywheel, and by general knowledge.
Fit piston rings.
Take up bearings.
Clean an oiling system.
Learn how to solder.
Assemble a Ford transmission.
Assemble a Ford motor.
Study the following carburetors: Holley, Tillotson, Schebler, Stromberg, (plain tube type), Zenith, Marvel, Johnson, Rayfield.
Repair a leaky carburetor.
Adjust the float level.
Test a battery.
Test a coil.
Test a condenser.
Wire up a Delco ignition system.
Wire up a Remy ignition system.
Wire up a Connecticut ignition system.
Disassemble and assemble a high tension magneto.
Adjust breaker points.
Test a spark plug.
Find firing order of a motor.
Set an ignition system to an engine.
Locate a loose connection in a generator.
Locate troubles in engines and run the engines.

Here then have been presented details covering the necessity for establishment of new work in our schools. Suggestion of equipment has been made in a number of phases and for schools of different sizes. The conditions existing in a given community will of necessity determine what should be installed and offered to students. The writer chose merely to emphasize the importance of the work and to write what may be of help to those faced with similar problems.

MONOGRAMS BY HAZEL G. COLLINS.

Reproducing Antique Furniture in the School

Article I.

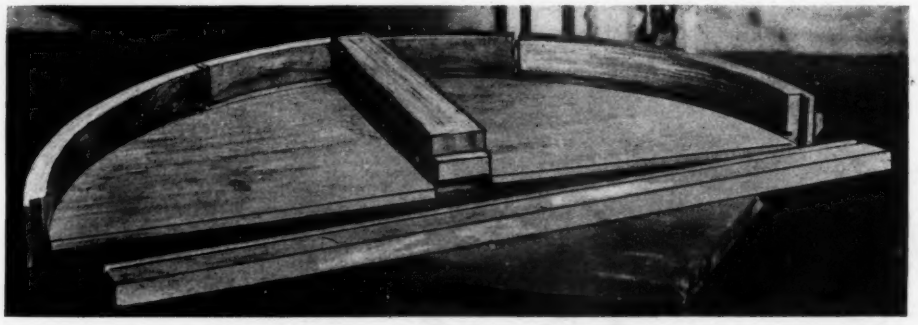
Herman Hjorth, Director of Technical Work, Roman Baldorioty de Castro Graded and Technical School, San Juan, Porto Rico

ANTIQUE furniture has a certain charm, individuality, and beauty of line, that is not readily equalled by our modern furniture factories with their systems of quantity production. Such pieces of furniture were generally made to order, and not in thousand lots; they were made at a time when cabinetmaking was more of an art and less of a business; when the workman was a master of all phases of his trade, rather than a specialist in a certain line or an automaton feeding a machine; when lumber was more plentiful and thoroughly air seasoned instead of the too often forced and weakening kiln seasoning of the present day; when time wasn't money in the sense it is today, but ample enough to permit the work to be well and conscientiously done, thereby upholding the highest professional standards.

Genuine antiques can not be had in every home. In the first place there are not enough of them to go around; and in the second place, the ones that have survived are very expensive and, therefore, only available to the fortunate few. Reproductions, however, can be made, not only by the professional cabinetmaker, but also by the boys in the school shop. Work of this kind is not original, but it is a departure and relief from the conventional, stereotyped school shop designs. And it is of value in developing good taste in furniture, thereby perhaps saving a good many homes from such monstrosities as the "parlor set", the "golden oak dining room", and the everlasting, crude, and clumsy "mission" furniture.

CARD TABLE, FIG. 1, SHOWING BOTH LEAVES OPENED.

CARD TABLE, FIG. 1, SHOWING ONE LEAF OPENED AGAINST WALL.



CARD TABLE, FIG. 1, READY TO GLUE TOGETHER.

Some teachers, however, demand that all work done by boys in the school shop must be made from an original drawing and design, whether it is good, bad, or indifferent. It must represent the boy's own idea and express his particular individuality. But if we look at the furniture turned out by the average school shop, we find that it is not so original after all; on the contrary it is usually very commonplace and greatly resembles furniture exhibited in stores and depicted in catalogs.

A great improvement in the public taste in furniture and interior decoration has made itself manifest in the last decade. Furniture factories of the better class are meeting this demand for better things by turning out some excellent pieces of furniture, generally reproduced from the antique, to which it seems to be the modern tendency to turn for guidance and inspiration. The manual training shop, however, has not kept pace with the times in this respect, and these problems are

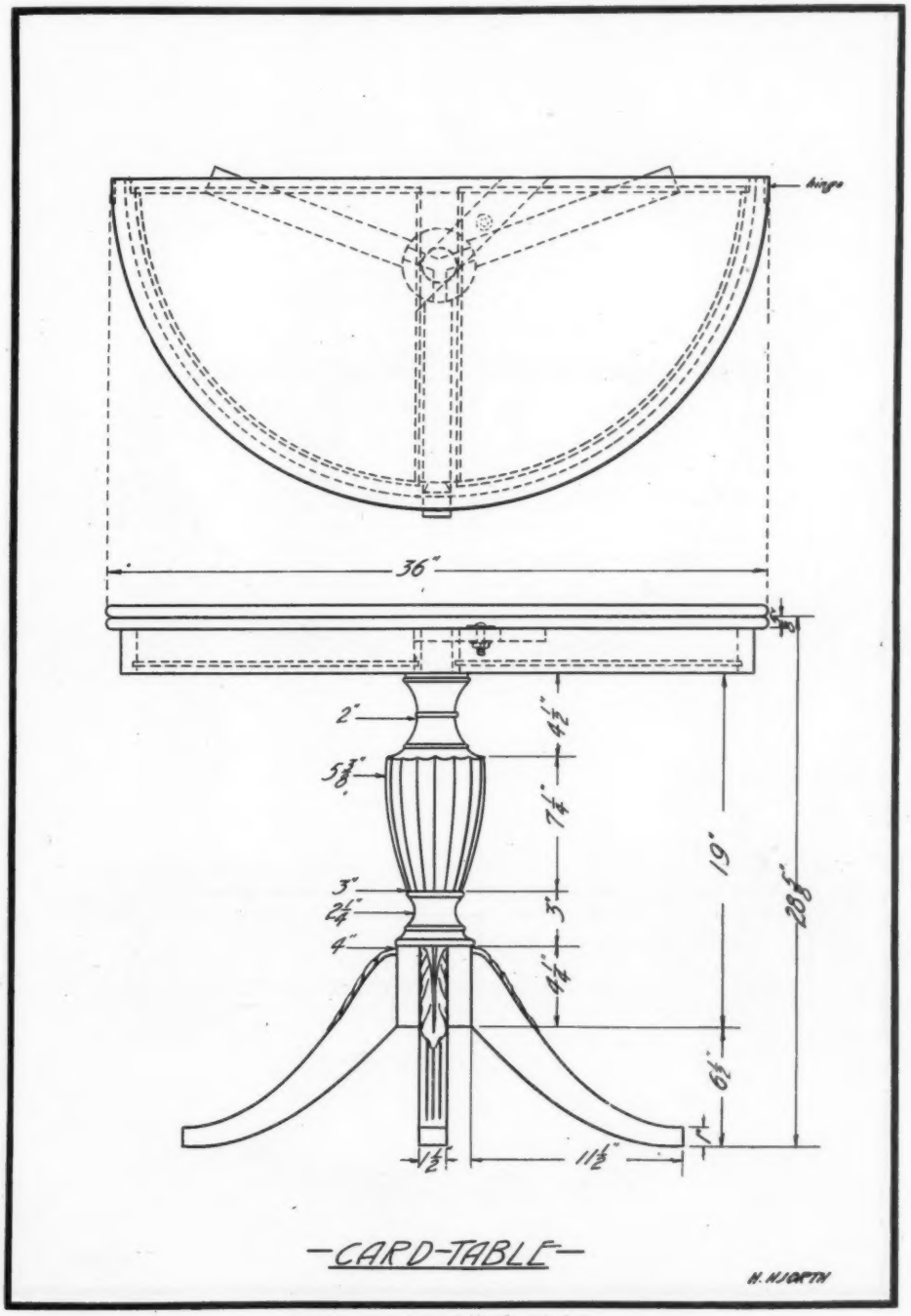


FIG. 1A. DETAILS OF CARD TABLE.

therefore presented with the following objectives in view:

1. To develop a general appreciation and taste for beautiful furniture and home furnishings.

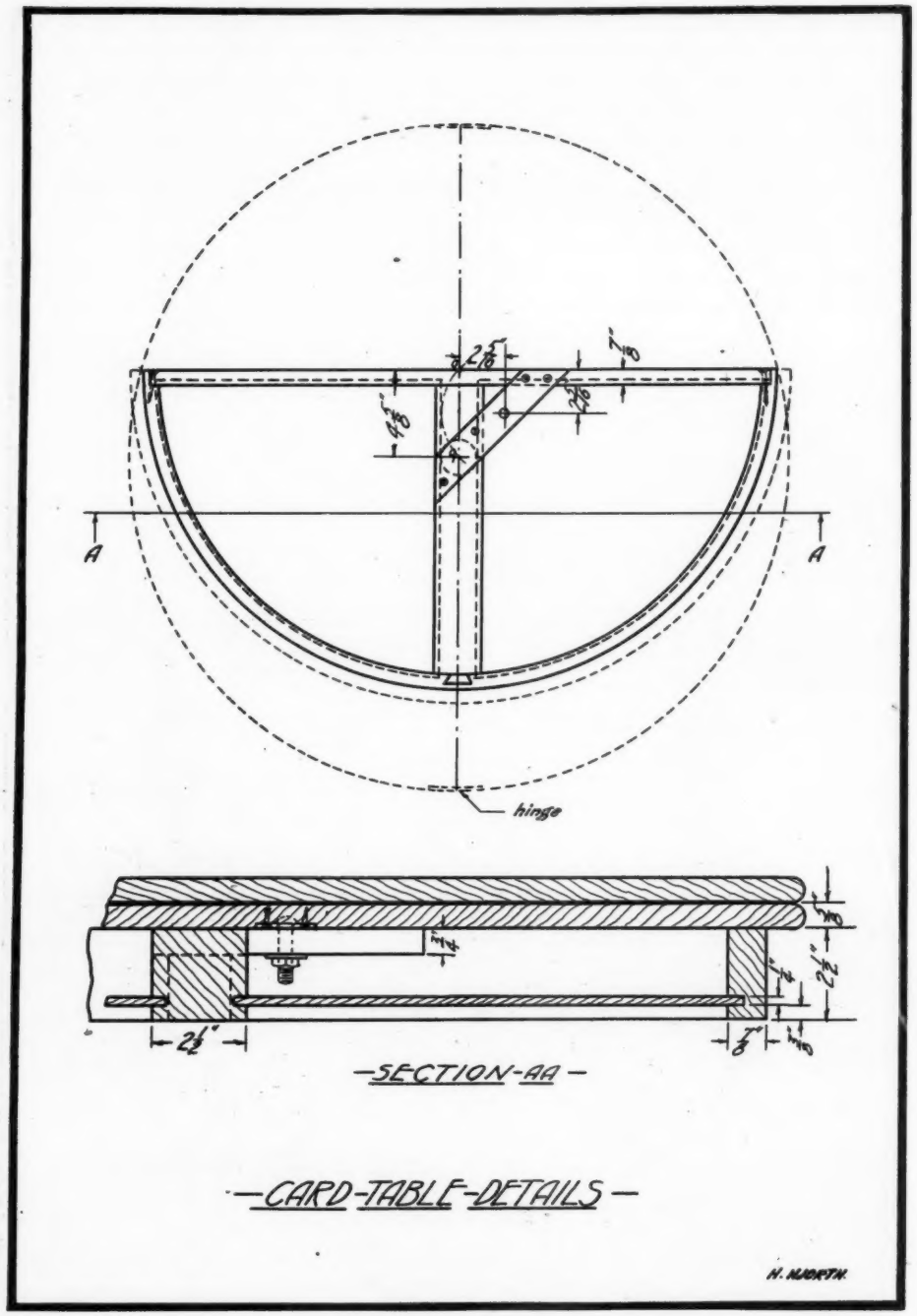


FIG. 1B. DETAILS OF CARD TABLE.

2. To teach accuracy and soundness of construction without unduly emphasizing skill.

The writer believes that skill is a component of accuracy and speed of execution, and that, while a person may do accurate work, he is not thoroughly skilled until he has acquired speed and dexterity through endless repetition of processes. Speed of execution is not within the province of the school, but care and accuracy should be emphasized in every shop. If that is not done, why waste time and money on the training of the hand? Why do anything that is not worth doing well?

The writer furthermore believes that furniture design is an art that can only be acquired through practice and the study of good examples; that, while it is highly

commendable to encourage originality, it is unfair to demand originality and at the same time good design of a boy who has had little or no training in this art; that good design is governed by certain definite laws just as well as is mechanical drawing; and that the violation of these laws must be corrected in one kind of drawing just as well as in the other, even at the expense of originality. Moreover, antique furniture may properly be termed the "classics" of cabinetmaking, for the man who can improve on the best designs of the seventeenth and eighteenth century has yet to be born. It is, therefore, but logical that the student of cabinetmaking should profit by the study of these classics just as well as the student of literature, architecture or music profits by the study of the classics in literature, architecture and music.

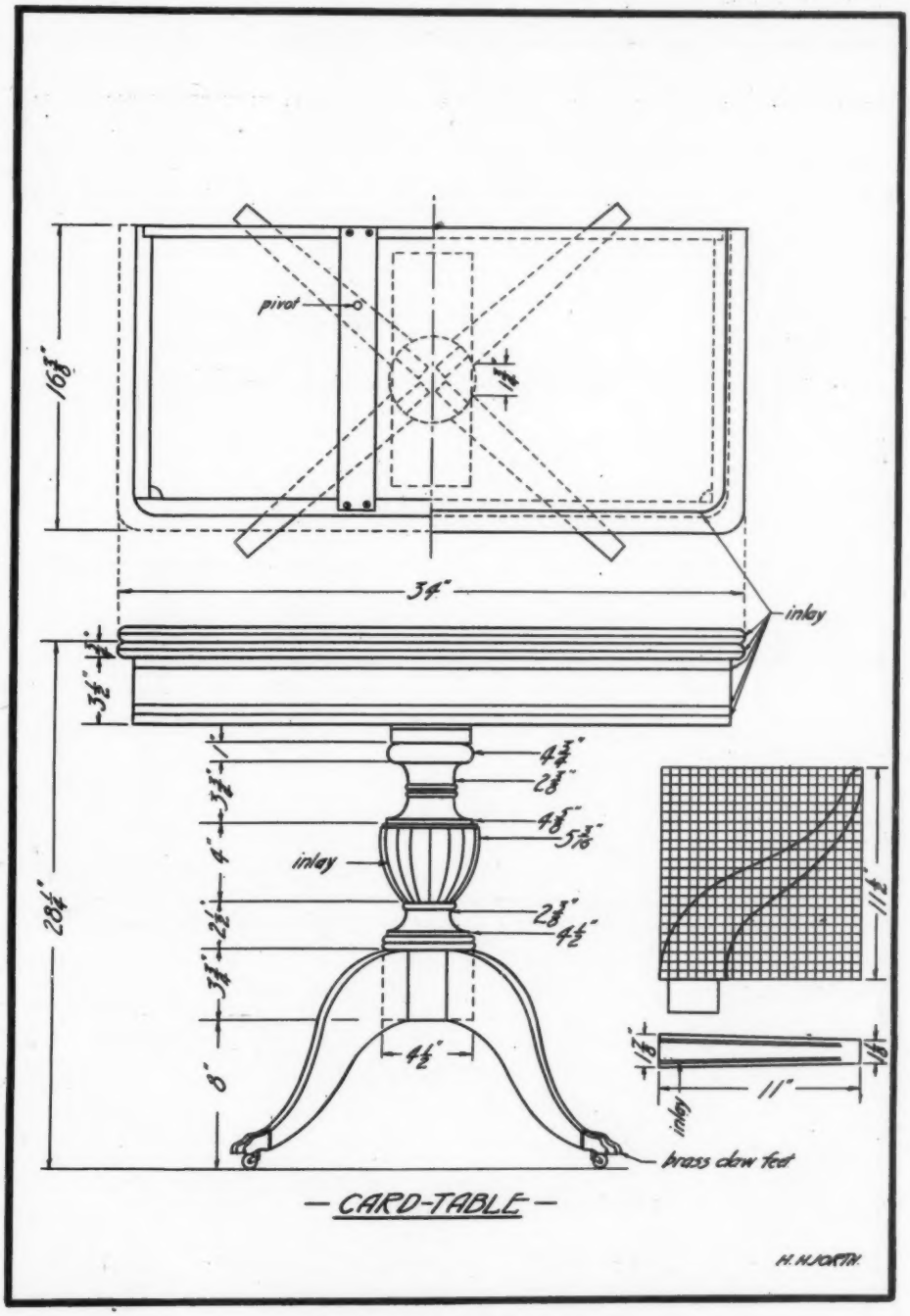


FIG. 2A. DETAILS OF CARD TABLE.

CARD TABLES.

Card tables first made their appearance during the William-and-Mary period (1688-1702) and have retained their popularity through the succeeding periods.

The card table illustrated in Figs. 1a and 1b is a somewhat free copy of a model made by the famous American cabinetmaker Duncan Phyfe (American Empire period), who had his shop in New York City during the first half of the nineteenth century. Phyfe was born in Scotland and was evidently much influenced in his designs by Thomas Sheraton, one of the greatest cabinetmakers of England, and also by Robert Adam, who developed a style in furniture based on the ancient Roman and Greek architecture, now known as the Adam period.

The working drawing for this table was made from a photograph. One of the first problems presenting itself, after the proper height of a card table had been determined, was the placing of the pedestal. It will be noticed that the table when not in use as a card table, is meant to be placed against the wall, either as indicated in the drawing, Fig. 1, with the two leaves folded, or as shown in the photograph, with one leaf opened against the wall. It is therefore imperative that the two rear legs at the base of the column are placed in such a man-

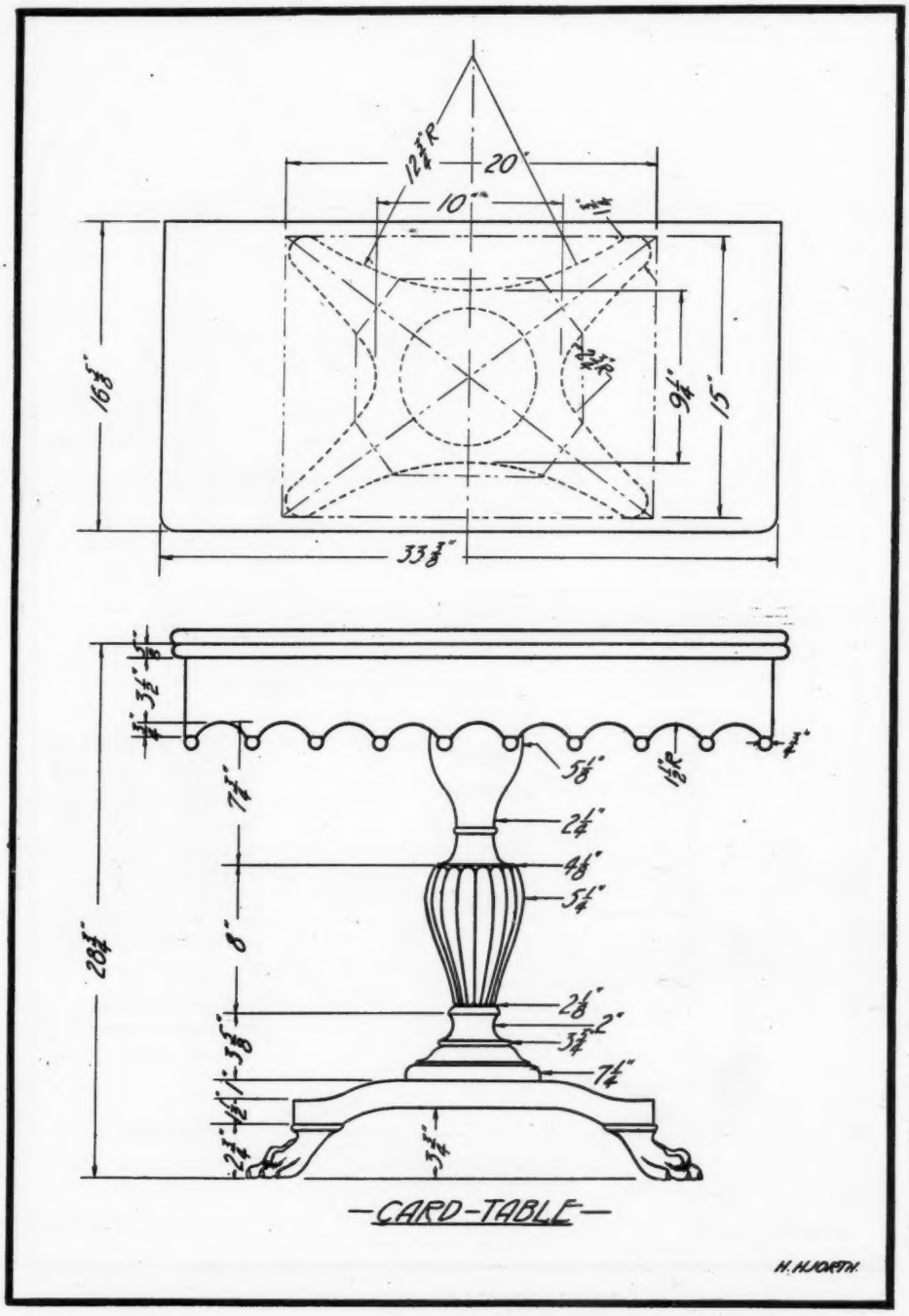


FIG. 3A. DETAILS OF CARD TABLE.

ner, that they project little or nothing beyond the rear edge of the table. This also applies to the third leg, which must not project much beyond the front edge of the table, so that people will not trip over it. In order to meet these conditions the space between the rear legs was made a little greater than the space between the front leg and either of the rear legs.

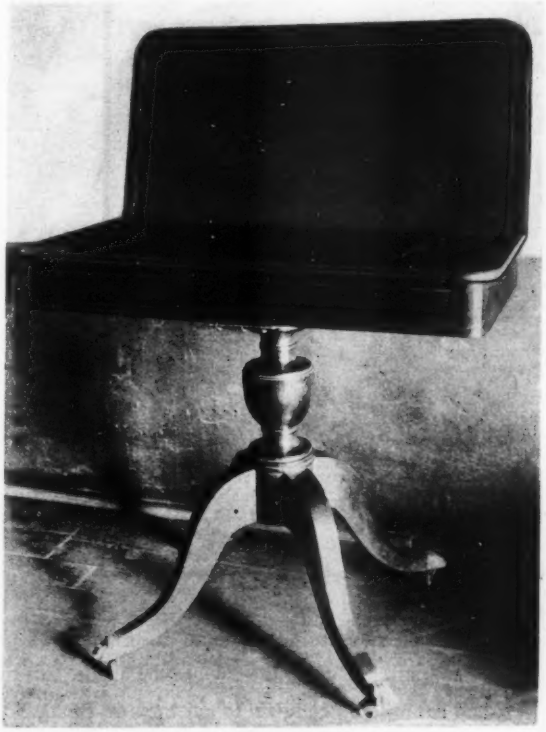
The next problem to be solved was the interesting mechanism, by which the top is revolved a quarter of a turn and opened, thereby doubling its area and converting a console table into a card table. This problem was solved by first studying the construction of a square card table on four legs, Fig. 4. It will be observed that one of the leaves of this table is held in position by means of a bolt or pivot on which it revolves. This bolt passes through a heavy cross rail, dovetailed in to the front and back rails and placed to one side of the center line, thus dividing the lower part of the table into two compartments of uneven size, suitable for keeping playing cards. chips, and other paraphernalia incident to a game of cards. The correct position for the pivot is found in the following manner: Divide the top in two halves and draw line *oa*. From the center of *oa* draw line *o'b* parallel to the rear edge of the table. Lay out $cb = o'c$, construct the square *o'cdo* and draw diagonals. Their point of intersection, which is equally distant from the rear edge and the center of the table, is the correct position for the pivot, and when the top is swung around point *o* will coincide with point *o'*. As point *o'* in the half round table is not in the center, the correct position

CARD TABLE, FIG. 3.
Courtesy of Mrs. W. R. Bennett, San Juan, P. R.

for the pivot, according to this principle, was found to be a point equally distant from the rear edge of the table and the center of same, so that with this point as a center point *o* will coincide with point *o'*.

With respect to the actual construction of the table, it is recommended to lay out a full size plan view on a large table top, drawing board, or other flat surface. The semicircular rim or apron may be divided into three equal parts, a template made, and the pieces cut out on the band saw. They should then be planed both on the concave and convex side with a circular plane. If a sanding machine is part of the shop equipment it is an easy matter to sand them smooth, otherwise a disc sander and a spindle sander can easily be rigged up in a lathe. It is important to sand the concave side before gluing the table together. The three pieces forming the apron are joined by means of a doveled butt joint. The cross rail and back rail are then made and joined to the apron as indcated. Before gluing, a groove, in which the bottom is fitted, is cut in the three pieces forming the apron, as well as in the cross and back rails. The diagonal piece for the pivot may be fitted in place afterwards.

The carving on the column and the legs is quite simple, but adds much to the beauty of the table. The column may be divided into the required number of parts by wrapping a strip of paper around it at any point and cutting it to the exact length of the circumference. The divisions may then be laid off on the



CARD TABLE, FIG. 2.
Courtesy of Mrs. E. W. Keith, San Juan, P. R.

paper and transferred to the column. The vertical division lines can easily and correctly be laid out from these points if the column is placed in a box without top and bottom and held on both ends by means of a nail driven through the centers of the ends of the box into the centers of the ends of the column. A tool consisting of a wooden bar with a block on one end, something on the style of a marking gauge, completes the outfit. The carving may be done with a veining tool, cutting grooves of equal width and length along the vertical division lines. The edges thus formed are rounded off with a skew chisel, scraped and sanded smooth.

The three legs are fastened to the column by means of tenons long enough to meet in its center, the shoulders of these tenons being undercut in order to fit the turned column. A template should be made for the legs, and care should be taken to cut them in such a way that the grain of the wood runs in the longest direction, thus giving them the maximum of strength.

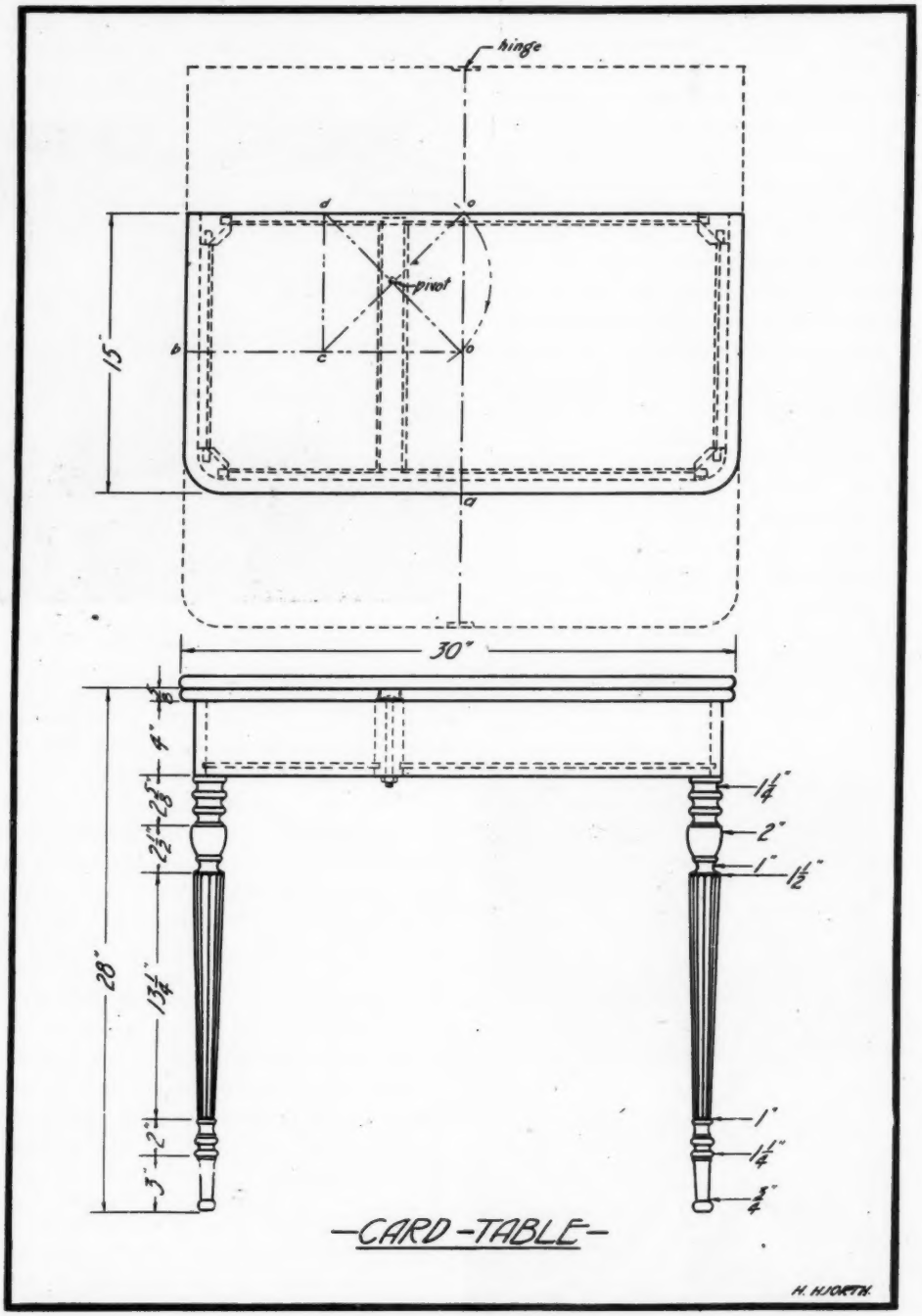
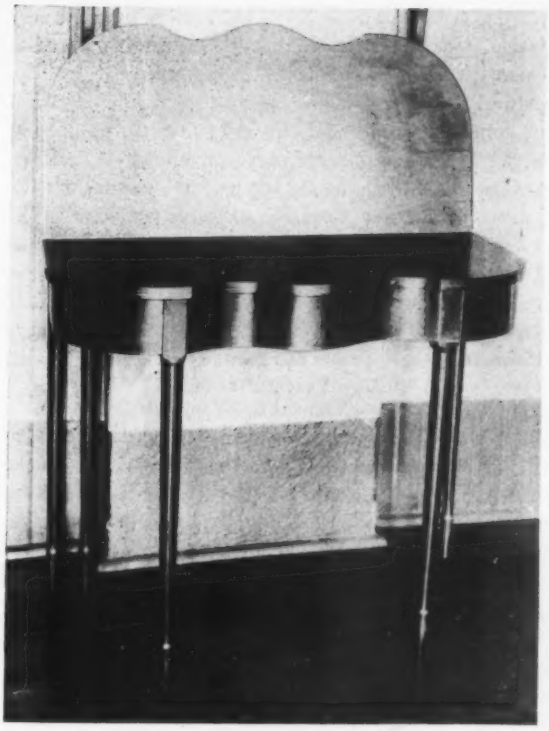


FIG. 4A. DETAILS OF CARD TABLE.

This table was made of solid mahogany, stained dark with bichromate of potash. It was given two coats of paste wood filler, followed by several applications of boiled linseed oil, thinned with turpentine, each application being rubbed absolutely dry and allowed to stand a day before applying the next.

The card table, Fig. 2, is another example of the period known as the American Empire (1795-1830) and is very similar in construction to the Phyfe table described above. It has four legs instead of three, and they are spaced so as only to project a little beyond the edges of the table. The piece on which the top revolves is similar to the one shown in Fig. 4. The column is supported on a heavy and somewhat unsightly board screwed to the underside of the bottom of the table. The legs have brass claw feet, which can be bought from P. E. Guerin, 21-25 Jane Street, New York City, who makes a specialty of all kinds of metal ornamentation.

Fig. 3 is still another and very beautiful example of the American Empire card table. The construction of the top and the revolving mechanism is similar to the previous one. Details of this part have therefore been omitted from the drawing in order to better clarify the construction of the base, which is rather out of the ordinary and presents some difficulties. The following method is recommended: First draw a rectangle 15″x 20″, full size, as indicated by the construction lines, then draw the diagonals and lay out the curves with a pair of trammels. Lay out a smaller rectangle within this larger one, approximately 11″x12½″ with the corners cut off perpendicular to the diagonals as shown on the drawing by the construction lines. Glue up 1½″ stock and shape to these dimensions. Cut the four pieces forming the corners of the base from 2½″ stock and join them to the 1½″ piece by means of mortise-and-tenon joints, so that they are flush with the piece on top. Lay out all curves from templates and cut out roughly on the band saw before gluing. The claw feet are screwed to the underside of the base. The construction of this base may be simplified by gluing up 1½″ stock to form a rectangle 15″x20″, thus making it all to the same level. Turned ball feet may also be substituted for carved claw feet. The column may be turned in two pieces, and the top, column and base bolted together by means of a long iron bolt passing through the center. The carving (beading) of the column adds much to its beauty.



CARD TABLE, FIG. 4.
Courtesy of Mrs. E. W. Keith, San Juan, P. R.

The card table, Fig 4 is characteristic of the Sheraton style of design. Thomas Sheraton (1750-1806) was the last of the great English cabinetmakers. He was a master of the technique of cabinetmaking as well as a master of design, especially championing straight lines, simplicity of form, and restraint and refinement in ornamentation. The beaded legs are characteristic of Sheraton furniture. The construction of this table is very simple and offers no difficulties.

The Teaching of Mechanical Drafting in the Lower Grades

John Hickman Brown, Woodworking Department, North Dakota Agricultural College

After three years of experience it has been decided in the Glendive School, Glendive, Mont., that the fifth-A grade is the logical place to introduce mechanical drafting. Immediately someone will ask what do we mean by mechanical drafting? Can a boy of this age do any drawing worthy of the name mechanical? It has been proven in this school that it can be done and that the boys understand what they do.

A boy of this age, from 10 to 12, is just at the period of the change in his ideals and actions. This is recognized in the school by transferring him from the primary to the intermediate grades. This is the age when direction and control are absolutely necessary if the boy is to develop those qualities which are desirable. At this time the gang spirit is uppermost; the boy begins to look most to the father as an ideal; he has a tendency to form habits of roughness as manifested in coarse language, dirty hands and carelessness in complying with, or definite refusal of obeying, requirements and commands. This oftentimes is simply the result of efforts of the boy to prove himself a man.

Up to this time the boy's instructors have all been women, and it is desirable that he come in contact with a man teacher. Mechanical drawing offers the first opportunity to bring the boy into contact with a man without removing him from the influence of the regular teachers. This oftentimes proves invaluable to him and changes his entire attitude toward the school. This is then the logical time to introduce industrial work. The writer is heartily in favor of, and has been accustomed to, having some form of industrial work in the first five grades. The work, if definitely planned and accurately executed, not only fills the purpose of the primary grades, but also improves the morale of the entire school.

Why Teach Drawing?

Why should mechanical drafting rather than some other form of industrial work be introduced in the fifth grade? In the first place, the boy does not possess the necessary physical strength to properly execute tool work which requires any considerable physical accomplishment. If woodwork is used as a typical example of several other courses taught, it has a tendency to develop into a form of amusement provided by the instructor for the pupils. In general, either the work is done by the instructor or very little real woodwork is done. We hear much nowadays concerning the desirability of maintaining the pupil's interest. Much poor teaching is permitted because the work is apparently interesting to the student, or at least it is excused on that ground. We have found that the surest way to lose a student's real interest is to teach him something in a lackadaisical way so that the results are poor or uncompleted projects. Similarly, all the tools are men's size, and are designed for real and accurate work. Too often a course develops into a series of play periods where the tools are used improperly and nothing worth while is accomplished.

In many homes the child is in the way. The chores are all done; coal, or gas, is burned, everything is delivered, and many boys are made to feel that they are unable to do anything. This encourages indifference or laziness in a school child. In industrial work, many boys are for the first time given a definite task and are held to the execution of it. The greatest enjoyment and self-satisfaction that boys have ever known will result from the accomplishment of a difficult job which they realize is real work or preparation for real work. We have found that their interest varies directly with the standard of the work demanded.

Contrary to popular opinion a low standard does not encourage interest but encourages indifference. A group of boys will immediately detect the lack of ability in the instructor, or lack of purpose in the work. We have found that the higher the standard of work provided it is a reasonable one—the greater the student's interest. For instance, the standard practice sheet of ink work required by us which the boys understood was to be thrown away, and which was simply preparation for the real work to come later, was done after class and an examination of the plates showed not a single mistake of any kind. This included dirt, bolts, difference in weight of lines, runovers, etc. Yet the boys came more than a half-mile in order to assure themselves of a place to work after school. Care must be taken, however, to keep the proportion of such work down to a minimum. It may be interesting to know that the average of voluntary overtime work in our industrial-arts department for the entire year was slightly over one hundred per cent of the regular required work. This was in spite of the fact that the standard which we set was very high, rather than because of this fact. A low standard encourages indifference.

Drawing Should Start at Early Age.

Mechanical drafting offers all of the possibilities of exact work at a small expense and is necessary before any well-planned construction work of any kind can be done. In a number of instances it has been possible to compare a student in the manual training shop who has had drafting in the fifth and sixth grades with one who has not had it. In nearly every case the student who has had drafting is far superior to the other boy, both in his shopwork and, in the majority of cases, in his regular school work. Fifth and sixth-grade boys possess the physical and mental ability to make drawings and their muscles and minds respond very quickly. Habits of accuracy, neatness and dispatch formed at this time will stay with them for life and carry over into their other activity; or as a concession to psychologists, at least the standards gained are applied to other lines.

Mechanical drafting is the universal language of the industrial world. At some time in every boy's life he comes into contact with drawings. A boy can easily be made to realize this. It is logical that every boy should be taught drawing especially as it is suitable when other forms of industrial work cannot be taught.

It is essential that some regular place be set aside in the school building for this work. It is advisable to have it in a separate room in the shop. Much depends upon the atmosphere of practical work. Where boys see drawings made and used, they appreciate their usefulness and importance. Bear in mind also that the school shop is about the only place where the boy can see things in the process of construction. Many of us in years past have spent hours watching blacksmiths, woodworkers, painters, and other mechanics in factories near our homes. Nowadays, the boy is unwelcome and can't see, even if he has the inclination. The school shop should offer these opportunities. It is the best vocational guidance possible, with the exception, perhaps, of definite courses along that line.

Simple Equipment Needed.

It should be unnecessary to describe in detail the equipment. It is sufficient to say that a few good tools are preferable to a large number of cheap ones. It is important that the equipment be kept in the best possible condition. It is difficult for a skilled mechanic to do good work with poor tools. It is absolutely impossible for a boy to do anything with any tools, but the best. The ruling pen is the most important to keep in shape, because it is impossible to obtain the required

standard of work unless the pen is sharp and clean. It has been found advisable in our experience to provide bottles of ammonia, padded on the bottom with felt, to prevent the nibs of the pen from becoming dull. Small slivers of soft wood, in addition to the regular wiping cloth are also necessary. If students are permitted to clean the pens with knives, it will be impossible to keep them in good condition. Adjustable benches are advisable in order to take care of boys varving greatly in height.

In most classes it is found advisable to spend some time on a review of fractions. Too few students can divide Aunt Eliza's estate between four nephews and three cousins, giving each a correct fractional part. We need arithmetic. It is necessary that a pupil know how to add and subtract, to divide numbers into halves, thirds, etc., to change mixed numbers into fractions and to reduce fractions. This will be comparatively easy to teach when the boys discover they are going to use the answers.

It is necessary that considerable time be spent on lettering and the making of arrowheads. After a careful analysis of each letter in class, much of the work may be assigned as outside work. It has not been found advisable to require formal lettering sheets, but rather to encourage constant practice and applied lettering.

First Lessons.

If care is taken, the novelty of the work and the atmosphere of the shop will insure an intense interest up to this point. The first lesson, truly concerned with mechanical drafting is taken from the following definitions:

1. A point is an exact location having no dimensions.

2. A line is the path of travel of a point having one dimension, length.

3. A surface is that which has two dimensions, length and width. It is obtained by moving a line sidewise (at right angle to its axis).

4. A solid is that which has three dimensions, length, width and thickness. It is obtained by moving a surface (toward the third dimension).

5. A curved line changes its direction throughout its entire length.

6. A straight line is the shortest distance between two points; does not change its direction, and contains 180 degreess.

It will be found that great care should be taken to firmly fix in mind the terms point, surface and solid. If care is taken, none of these definitions will need to be given to the class, but the class will be able to give them to the instructor after various illustrations and carful questioning. These should then be carefully revised and given out in the form of instruction sheets, for review work at the subsequent lesson. It will be found possible to have a class develop nearly every definition for this work.

The next subject should discuss the differences between perspective and mechanical drafting. This can be clearly shown by the use of a blackboard, projection-cage and folded papers. At this stage, much freehand sketching of actual objects, preferably for the entire class at the blackboard and later as pencil work, should be done. The work should be given with the purpose of firmly fixing in mind the idea and method of mechanical drafting, together with the choice of different views. The first four definitions, if properly developed, will help immeasurably with this.

The First Plate.

The next logical step is the teaching of dimensioning. Care should be used to point out that each solid always has three dimensions and that two may be shown on any one view. It has been found helpful in the author's classes to dimension the first drawings with capitals, denoting the thickness, width, and length, instead of using actual figures. This will clearly show that thickness may be shown on the side, the elevation, and the top of plan views. The student at this time, should be able to sketch freehand any simple solid, choosing his own views and properly putting in over-all dimensions with a few simple dimensions.

The class is now ready for work with instruments. It is advisable to have the first plate consist of actual drawings rather than mere lines and geometrical forms. The skill acquired in the drawing of mere lines may also be obtained with equal facility in the drawing of simple objects. This is not entirely new work because the students have previously made drawings of these same objects freehand. These are redrawn on good paper, in pencil, with emphasis on good technique. Later, after the students have acquired the ability to sketch freely, the sketch may be changed to a mechanical drawing, free from errors of theory and may be followed with tracing work.

The writer and the superintendent of schools have not agreed on this point, the latter favoring a maximum amount of tracing because of its beneficial effects on the morale and on the standard applied to the rest of the student's work. It is the writer's opinion that a minimum of tracing, if any, should be given in these grades and that the entire time should be spent in the acquirement of ability to sketch and to draw freely, rapidly and accurately.

From this point the work is simply the introduction of new problems involving new principles and new applications of old principles. These are given in the following ways: (1) Actual objects are provided to be drawn with or without changes, (2) written or oral descriptions are presented, (3) another's freehand or isometric sketches or halftones are introduced, (4) the class is required to change finished drawings in size or design, (5) the drawing of the student's own ideas and designs are requested. The acquisition of skill and technique will be almost automatic, and long before this the boys will be making drawings which are a source of surprise and wonder to outsiders and a pleasure and inspiration to the instructor.

Require Practical Drawings.

In all the work from this point on, the standard is that of commercial work; in other words, we ought to plan and demand practical drawings. The objects drawn are not made so difficult but that the student can produce a high standard of work. The writer holds strongly to the position that mechanical drafting as sometimes given, that is, the mere copying of other drawings, is beneficial to any extent.

Copy work should seldom, if ever, be given, except for a few plates of conventions, and most of these in advanced work. Mere copy work does not enable a student to learn mechanical drawing; it simply teaches technique in a very dry, uninteresting way. The main purpose of the work is to teach the principles of drawing. The application of these principles is bound to result in a technique. It is very easy for the instructor to set any desirable standard, far superior to that obtained in copying.

The average student who finishes the sixth grade in this school is able to sketch freely, to draw accurately, to trace and to blueprint if necessary, any simple object. More than this, he is able to read any simple drawing. The student who does not possess this ability, together with the ability to present his mental ideas in a clear, comprehensive drawing or sketch, will always be under a handicap.

A very excellent test is to furnish the boys with several prints and to display the objects drawn, with numbers, requiring the members of the class to number the drawings correctly. They soon acquire the skill to read drawings rapidly and accurately. Each test may be made more difficult by having the objects more complex and having several objects practically alike except for details; for instance, a boss on one end and a corresponding hole or depression on the other.

Effect on Other School Work.

We have found that the boys who have had drawing will do at least twenty per cent more work in other lines of industrial work; that their regular school work is also improved in content, accuracy and neatness. Many boys have never had a standard for comparison; they gain a clear, comprehensive knowledge of the essentials of drawing. Boys in the fifth and sixth grades can more profitably employ their time in mechanical drawing than in any other line of work. In our experience the boys who have had drafting prove conclusively, when at work with boys who have pursued some other line of industrial work, that they are capable of doing better and more thorough work. They possess the ability to plan and to organize their operations to an extent impossible to those who have not had mechanical drafting. Students who have had four years of woodwork in the grades, and those who have had two years of woodwork and two of mechanical drawing, demonstrate this very effectively because the latter are able to produce more and better work in less time than the former.

The following is a statement from Mr. R. H. Brown, superintendent of schools, Glendive, Mont.: "The fundamental idea is to develop in the child a purposeful activity so that the personal interests become a means of learning to do by doing. The degree of perfection that the child reaches in this work is wholly personal and he gradually comes into his own in the work at an age when the impressions are lasting throughout life. He very soon learns that there are recognized standards that he must reach to receive passing recognition. In vocational work, as nowhere else in the school curriculum, the personal attainment is present and before the eyes of the student.

"This reacts for good in all other school activities where there are not the concrete standards for comparison. By correlation the other instructors in the school system find the influence of mechanical drawing in the fifth and sixth grades as outlined, reacting to produce a much higher standard of work from the pupils. The self-recognition of ability to accomplish demands from him respect of this ability in others."

Cameo Cutting as an Amateur Art

John Walsh

I HAVE been a reader of various art magazines for many years and have seen nearly all the arts described in that time, except the art of cameo cutting. There may have been books written on this subject but the writer has never been able to find any in this country. This being the case with myself, I believe there may be others interested in this work, who would be glad to hear of methods employed by another amateur cutter. Also this article may interest some people, who have never given this art much thought.

There are many kinds of cameos; cameos of precious jewels which is lapidary work, also cameos cut from agate and coral. This type of cameo is expensive and very hard to work. Then there is the shell cameo; the raw material of which is cheap and can be worked with very simple tools. Therefore, in this article, we will only talk of the shell cameo. The shell cameo is a very pretty ornament and can be made a work of art.

One of America's famous sculptors began as a cameo cutter and if one had an authentic cutting from this master, it would be worth its weight in diamonds. In Europe cameo cutting is taken more seriously and good artists turn out some beautiful work and I believe the art could be encouraged and made to grow in this country. A number of our art museums have a collection of cameos and sulphur copies of great European stones where anyone interested can secure much help.

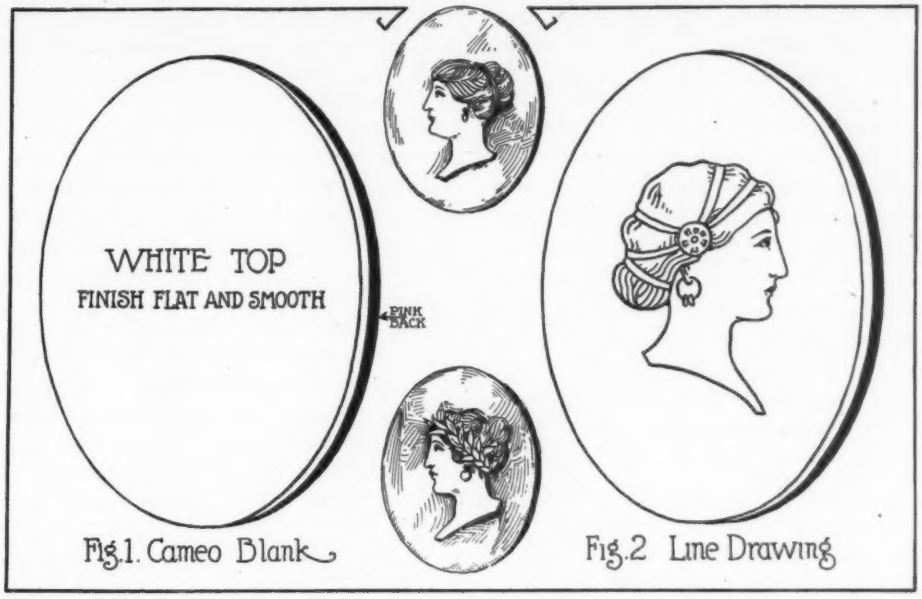


Fig.1. Cameo Blank

Fig.2 Line Drawing

I will try and outline a method which amateurs may follow and if they have had practice in modeling, wood carving, or have any artistic skill, good results should follow their efforts. The raw material may be a large Conch Shell, which used to be in all parlors on the "Whatknot" but which is now generally used as a door weight. Inquiry among your friends will generally disclose the fact that some Aunt or Grandma has one of these shells which they will sacrifice on the temple of art especially if they hope to receive a cameo in return. This shell is about the size of a large cocoanut. It can be broken up with a hammer but the best way to work it up is to cut it into sections by a thin emery wheel. Any blacksmith shop, machine shop, or saw grinding shop can cut up the shell in small sections. The outside of the shell is rough and dark, the inner curves will show a pretty pink. Right below the rough outside is a pure white, comparatively soft, stratum adjoining the inner pink part.

Select a piece of the shell which has a good pink back and as nearly a plane surface as can be found and grind or file off the rough outside bark and you will have a piece of shell with two strata, one stratum pink from 1/32″ to 1/16″ thick and another stratum pure white about ⅛″ to ¼″ thick.

For the beginner I would suggest that the white layer be ground or filed down to about ⅛″ thick. Now grind the edges until you have an oval shape of the desired size. The pink or back layer of the shell will be curved to the same extent but the white part should be filed flat. You now have a "blank" like Figure 1.

The next operation is to "put on" the design to be cut. This can be done either by direct drawing of design on the white surface of the blank or by selecting a profile drawing of the right size on head and shoulders. Trim the margin of the drawing down to size of the blank, cut a piece of carbon paper same size and trace the drawing on blank on the white side. Already you have something pretty, a polished pearl oval with clean line drawing on same. Now you must select tools. I have cut a few cameos with a good jack knife and two small files but this is very slow work. A set of "Die Sinkers" files are needed. These files are from 3½″ to 5½″ long. The writer uses a set of Swiss "die sinkers" files 5½″ long and finds them very good. There are generally twelve files in the set of various shapes; round, square, diamond, V-shape, etc., all running to a fine point on one end. These files come in a small case and can be carried in a pocket or purse and after the blank is made and the design "put on" the student can carry the outfit in his pocket and work whenever he may have time to spare.

The next step is to cut away around the drawing all the white material down to the pink stratum. The student should be very careful not to remove the outline drawing but to work to the line, being careful not to undercut but to file straight down. This is slow work at first but with practice, speed can be attained. Now file the pink layer or background smooth and polish with fine emery cloth. In the description, I am presuming the student is cutting the side view or profile of human head in low bas relief. This being the case, it can readily be seen that much care and patience must be used in working away the material around the drawing. Be sure not to undercut for when modeling down to pink, the nose or chin may be ruined.

Now comes the part where real modeling or sculpturing can be learned. Any careful workman may finish a cameo up to this stage. The entire drawing now stands out in square bas relief ⅛″ high with hair, eyes, nose, mouth, and all the features in outline drawing against the pink background. The next step is to file

the face and neck of the drawing down rather flat about 1/16″ below hair and drapery. You have now lost the eyes, ears, and all the features except the outline. This will also be a good test of how closely you carved to the line drawing. The writer believes for a beginner you should have the drawing on a piece of paper cut to size of the blank, as it will help to relocate the features after you have filed down the face and neck below the hair and drapery.

Next start to carve the nose. Taper this down to pink, work out the curve and nostrils, work up to the eyelids and forehead, cut out the mouth line, chin, and cheek. In this work use small files and small knife blade. Also have emery cloth cut up in small pieces and keep the work as smooth as possible. The beginner should use the simple treatment of hair and drapery.

Do not get discouraged. Take time and use patience and after a few trials, you will be surprised how easily this work can be done. If the student has a dentist friend, the roughing out work can be made easy. After the drawing is applied, take the blank to the dentist's office. Have him use his dental engine with small grinding wheels and burs to cut away the superflous white around the drawing. By using a long straight mill bur, he can cut up straight to the drawing and polish up the pink background.

The writer cuts nearly the whole cameo with a dental engine, using small grinding wheels, end mills, burs and polishing discs. But at that, I believe I really enjoyed my first hand made cameo the most. I remember the remarks of a celebrated American sculptor in Paris one day on the lack of good craftsmen in minor art in America. This artist holds that one of the drawbacks to American art is that we refuse to do things with our hands, whether to wash clothes, mix bread, or cut wheat. I believe he is right. This art will help the hand and eyes to work together.

The writer has been interested in cameos for many years, reading the history of famous stones and always availing himself of every opportunity to see the famous cuttings. It was my privilege to be connected with art work in European museums for a year and thereafter I took a new interest in the work. Paris has many fine collections by famous artists. What I believed was a pretty craft I found could be made an art. I believe many people could take up this art and enjoy it and also turn out good work with a little practice.

A Woven Sewing Stand

L. F. Hyatt, Instructor, Advanced Cabinet Making and Reed Furniture Weaving, McKinley High School, Canton, Ohio

Necessary Material.

4 pieces ¾″ dowel 10″ long.
2 pieces ¾″ dowel 10⅛″ long.
2 pieces ¾″ dowel 10⅜″ long.
4 pieces ¾″ dowel 30″ long.
½ lb. winding material.
1¼ lb. No. 3 material.
4 oz. No. 5 material.
70′ 50 stakes 8″ long.
50 stakes 6″ long.
11 stakes 11¼″ long.
2 pieces of oak ¾″ x 11½″ x 12″.
2 blued steel screws No. 6.

I. The Frame.

Eight and one-eight inches from one end of each of the 30″ pieces of dowel bore 3/32″ hole for nailing through to the boards. Fourteen inches from this hole bore another one of the same size, boring through from the same side of the piece and on the same angle. Bore holes in each corner of the oak boards to receive the ¾″ dowel legs.[1]

Bore 3/32″ holes all the way around both ¾″ x 11½″ x 12″ pieces, ⅜″ from edge, having 14 equal spaces on the sides and 13 equal spaces on the front and back.

Glue and nail the ¾″ x 11½″ x 12″ pieces to place. the first piece 7¾″ from top of legs and the lower piece 14⅛″ from lower edge of top piece.

Bore holes and nail 10″ dowel pieces *a* and 10⅜″ pieces *b* as shown (Fig. 12). This completes the main framework.

[1]See f, Fig. 3, Industrial-Arts Magazine, Sept., 1921, p. 347.

To make the lid, ⅜″ from the ends of the two 10″ pieces of ¾″ dowel bore a 3/32″ hole. 1⅞″ from these holes bore another hole the size of the stakes being used, and space the remaining distance 11/16″ and bore for stakes. Nail the ends of the two 10⅛″ pieces to the 10″ pieces, through the first holes mentioned.

II. Strapping.

The strapping must be neatly done, keeping the strands very tight. One should always choose the number of straps according to the amount of space to be covered. This project calls for strapping at the four corners of the lid, and the four corners at the top of the framework.

The two front corners of the lid are strapped as shown at *1* and *2* (Fig. 14). Cut eight pieces of winding material, which has already been soaked, 3½″ long. Nail each piece to the horizontal rod at the end, as shown at *e, f, g, h*. Next nail the pieces to the vertical rod as shown at *a, b, c, d,* (Fig. 14) using ⅜″ No. 20 wire nails. The other ends of these 3½″ pieces of winding material are woven in and nailed according to the following direction:

Bring strand *e* around at the top,
Bring strand *a* over strand *e*,
Bring strand *b* over strand *e*,
Bring strand *f* over strand *b* and *a*,
Bring strand *c* over strand *f* and *e*,
Bring strand *g* over strand *c*, *b*, and *a*,

Bring strand *d* over strand *g*, *f*, and *e*,

Bring strand *h* over strand *d*, *c*, *b*, and *a*,

and nail on the side marked back. This, if correctly done will fasten the ends of all the strands with one nail.

The two corners at the back of the lid *b* (Fig. 13) should be strapped just one way. Nail the straps on the rod, the end of which is butted against the 10⅛″ pieces. No straps are needed on the end of the latter piece as the lid is hinged here by a couple of No. 6 two-inch, round-head, blued steel screws.

The four corners at the top of the framework are strapped as at *a* (Fig. 13). Follow instructions given for figure 14 in strapping corners where vertical and horizontal dowels meet. Then nail five strands to the lower horizontal rod and carry them around vertical rod, nailing to opposite side of horizontal rod. This will cover the lower part of the former strapping.

III. Winding.

The winding is done as in the lamp project.[2] Wind up from the bottom, across one of the horizontal rails at the top, and down the leg at the opposite corner. If going from the leg to the high rod, slip the winder up under the strapping, thus avoiding cutting the winder. If going from leg to lower rod, this is not necessary. In starting a strand for other cross rails begin by slipping end under strapping. Fastening ends and splicing have previously been explained.[3]

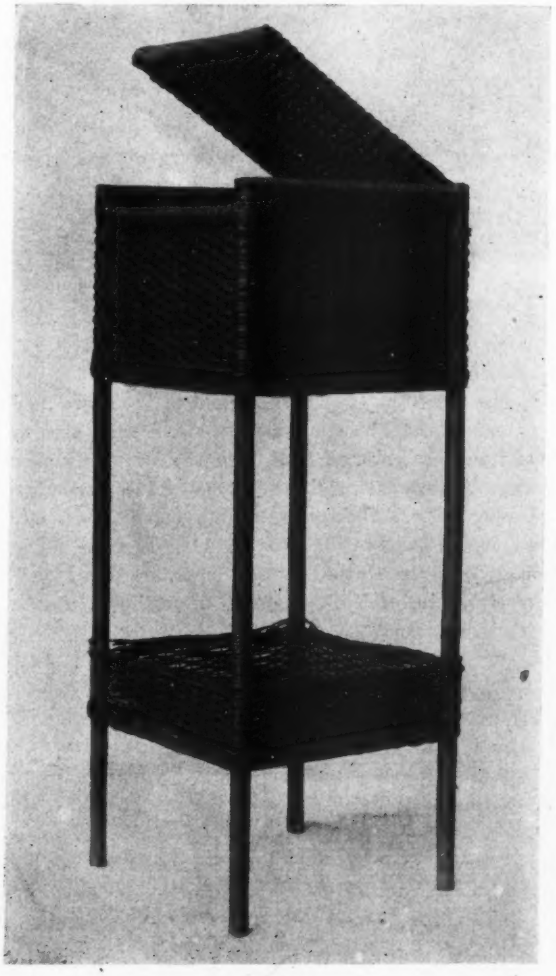


FIG. 11.

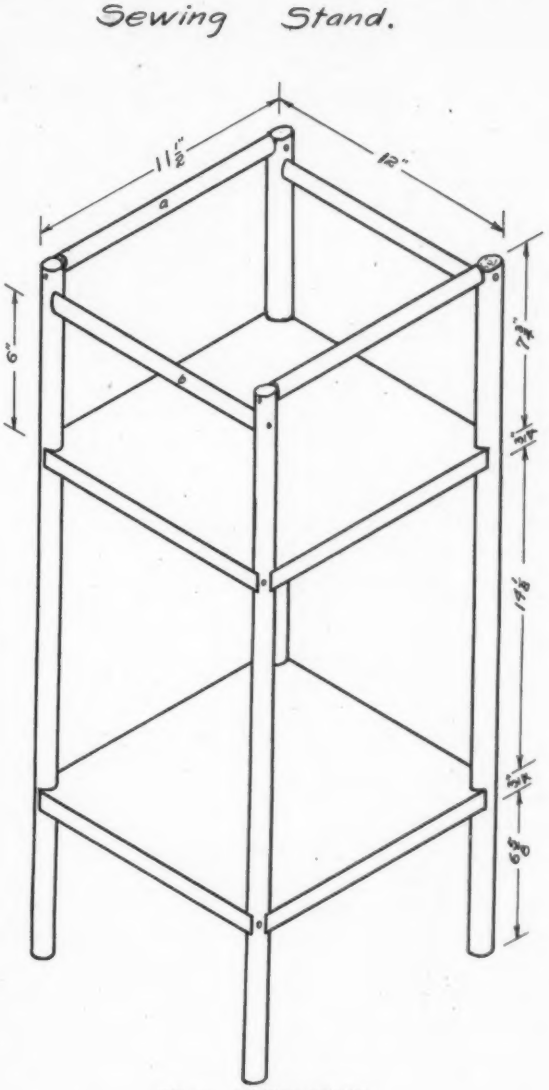


FIG. 12. SEWING STAND.

IV. Staking and Weaving Lower Part.

Cut 50 stakes of No. 5 material 6″ long. Glue and insert in holes in bottom board. Weave around once with the three rod coil using No. 4 material.[4] Then, using two weavers of two strands each, of No. 3 material, weave with over and under weave 2″ above the board.

Two weavers are necessary in this weave, with an even number of stakes. Start one double weaver and weave around until the beginning stake is reached. Then insert the next double weaver behind this stake

[2] See Industrial-Arts Magazine, Sept., 1921, p. 346.
[3] See Industrial-Arts Magazine, Sept., 1921, p. 347.
[4] See Fig. 9, Industrial-Arts Magazine, Sept., 1921, p. 349.

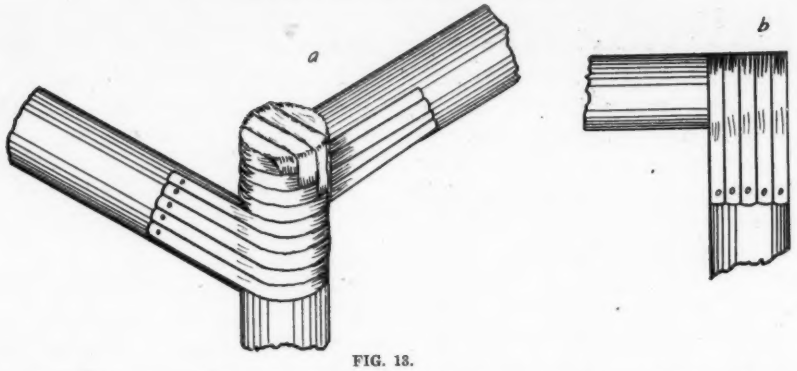


FIG. 13.

and carry around to the first weaver. Then use the first weaver, thus alternating. (Note—A heavier weaver of reed or fibre cord could be used instead of No. 3, or ¼″ flat of either could be used.) A three rod coil is then put around, with No. 4 material, and the weaving is finished off by bringing each stake in front of two and back of one.

V. Weaving Sides of the Basket.

Cut 50 stakes 8″ long of No. 5 material. Glue and insert. The three rod coil is woven around first with No. 4 material and the weaver is put in just as it was in the lower part except that the two weavers have three

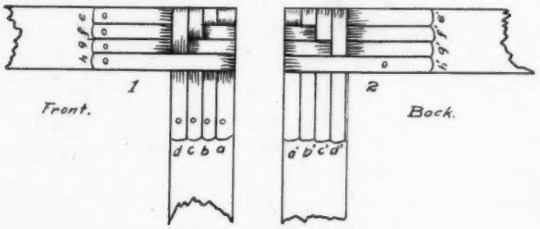


FIG. 14. BOOK RACK.

strands each instead of two. Weave up close to the horizontal rail. This finishes the weaving of the front and back but here we encounter a difficulty which is quite common in woven furnitre. Owing to the difference in height of rods going around the top it is impossible to carry the weaver around the leg in finishing the sides, so a new stake *a* (Fig. 15) is put down in beside the corner post. This stake is then woven around instead of the ¾″ rod. Weave the two sides up to the top and finish off all sides as shown in (Fig. 16) in front of one, and back of one, working from the inside. The stakes must be crushed with the round nose pliers close to the weaving before bending, if reed is used, and the last stake at each corner can be forced down into the weaving. This "finish" will have a tendency to flare from the horizontal rod, so to prevent this, nail it to the rod at each place where the stakes cross, forçing the nail through both stakes (Fig. 16).

VI. Weaving the Lid.

Strapping of corners has been explained under II this project. Wind the frame. The holes are opened

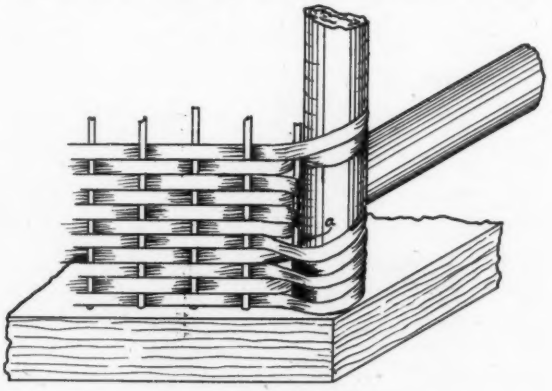


FIG. 15. SEWING STAND.

by forcing a blunt awl into each one.

The 11 stakes 11¼″ long, No. 5 material are then glued and inserted in one side. Weave with a three strand weaver back and forth with the over and under weave. After weaving three-fourths of the way across the other ends of the stakes are glued and forced into the holes. Complete the weaving and screw the lid in place, the two screws acting as hinges. Tacking on a four ply braid, of No. 3 material around both boards, finishes the strand.[5]

[5] See Fig. 4, Industrial-Arts Magazine, Sept., 1921, p. 348.

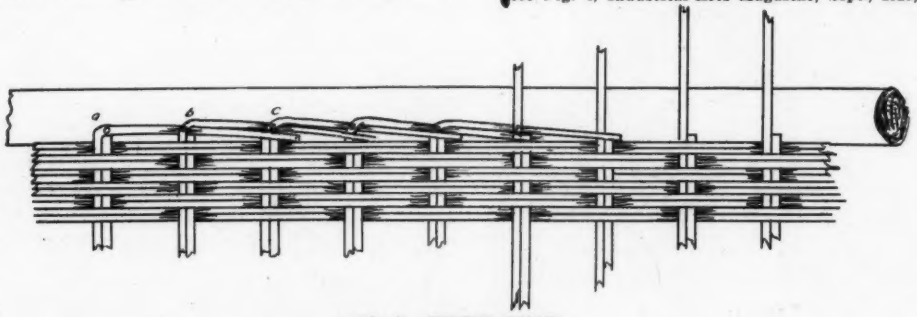


FIG. 16. SEWING STAND.

Industrial Arts and Prevocational Education in Our Intermediate and Junior High Schools

Methods of Successfully Offering Courses and Projects

(Article III)

A. H. Edgerton, Indiana University

A LARGE number of perplexing problems confront those who conscientiously undertake to select, organize, and offer representative industrial activities designed to meet the needs of early adolescence. There always are the various difficulties which are involved in properly *reflecting* and *interpreting* the many inherent conditions and relationships in modern productive industry. But, in order to realize successful instruction in the industrial activities represented, the psychological and physiological growth of the pupils must be recognized and respected during this all-important period of development. Many useful methods have been devised for selecting and organizing the various try-out or exploratory types of industrial courses, in order to *help boys prepare themselves for the demands of many-sided service* as well as for intelligent citizenship. These helpful suggestions were reported in the two preceding articles dealing with the investigation of 379 progressive intermediate and junior-high schools, which are located in 21 different states.

This investigation and the majority of the recent school surveys make it evident that the influence of traditional practices, rather than the actual needs of our new and rapidly changing social conditions, still determines too largely the kind and amount of emphasis which the industrial experiences receive in much of the upper grade curricula. The tendency to covet this familiar conception of education, which has the imparting and mastery of that great store of knowledge in school textbooks as its aim or purpose, undoubtedly is an inheritance from those early days before the sum total of the things worth knowing had increased many hundredfold. We have an abundance of early and recent records which share this attitude toward education with Oliver Goldsmith, who in his writings modestly expressed a yearning "to show" his "book-learned skill." Despite the many evidences of this inheritance which still exist in our American school systems, it is obvious that the growing demand for education today is not so much for the mere accumulation of a mass of facts as it is for the ability to reason from facts and to learn where to find valuable information when needed. At any rate, our present difficulties in meeting the needs and respecting the interests of seventh, eighth, and ninth year boys can not be solved satisfactorily unless a reasonable amount of time is allowed for giving instruction in a fairly wide range of profitable shop experiences and the wealth of related information involved.

Industrial-Arts Instruction and Characteristics of Early Adolescence.

Much has been said and written by G. Stanley Hall and other students of psychology regarding the characteristics of early adolescence, but a surprisingly small amount of suggestive material is available as yet for aiding those who are responsible for making the practical applications so essential to efficient industrial arts instruction. The need for adapting the methods of teaching the industrial activities to the peculiar characteristics of boys from 12 to 15 years of age is evident to all close observers. While the nature of the instruction during this period will be determined partially by the variable types of activity represented in the different schools, nevertheless, it is now recognized that the most effective results can be realized only when the methods are flexible enough to provide for the individual differences, as well as for the varying abilities and needs of the differentiated groups.

The greater part of the schools that reported on this phase of their instruction expressed some need for representing a variety of industrial pursuits so that the experiences will be well adapted to the problems of revealing capacities and developing special interests and powers, which are in keeping with the general aims and purposes of their respective school organizations. Several even insist that this cannot be accomplished fully unless allowance is made for freedom in choice and for individual experimentation. Others place the main emphasis upon methods for supplementing the school activities by excursions to study the larger constructions in productive industry, which they believe will do most in helping boys of early adolescence to discover the value of their inclinations, either in positive or negative ways. Not only do some of the schools provide opportunity for each boy to try out, discover, and develop any special ability for doing and managing industrial work, but they also furnish information for maturing the pupil's judgment of industrial problems and relationships. The reports indicate that the best results have been gained by interpreting that valuable directly and indirectly related industrial knowledge which is an outgrowth of the manipulative aspects of shop experience. These rapidly developing courses thus *attempt to make provision for constructive thinking,* as well as to give contact with typical materials, tools, processes, and shop organization. The psychological foundation for this procedure is sound, as *much of the educational value in these industrial experiences will come from the various habits, attitudes, and appreciations established* in meet-

ing both the simple and complex situations which arise with the proper responses.

The likes and dislikes which are fostered by boys of this age, as well as their correspondent relation to abilities and inabilities, have an important bearing on the methods of instruction given in the industrial-arts activities. A few years ago, Dr. Edward L. Thorndike of Columbia University measured the permanence in the interests of one hundred individuals, and also the resemblance between interest in the upper grades and capacity in the college period, with the following conclusions: "These facts unanimously witness to the importance of early interests. They are shown to be far from fickle and evanescent. On the contrary, the order of interests at twenty shows six-tenths of perfect resemblance to the order from eleven to fourteen, and has changed therefrom little more than the order of abilities has changed. It would indeed be hard to find any feature of a human being which was a much more permanent fact of his nature than his relative degrees of interest in different lines of thought and action. Interests are also shown to be symptomatic, to a very great extent, of present and future capacity or ability. Either because one likes what he can do well, or because one gives zeal and effort to what he likes, or because interest and ability are both symptoms of some fundamental feature of the individual's original nature, or because of the combined action of all three of these factors, interest and ability are bound very close together. The bond is so close that either may be used as a symptom for the other almost as well as for itself."[14]

Although some promising psychological devices and tests have been developed for selecting persons for specific occupations, there is no better method in use at present for discovering the boy's capacity for each type of industrial experience represented in the school workshop than to observe the degree of success and failure as he develops each division of the work and study. A suggestive experiment also has been conducted with 24 apprenticed boys, who ranged in age from 12 to 17 years, in order to ascertain whether or not those using hand tools in a systematic and workmanlike manner in one division of industry can do tasks of equal difficulty in other industrial pursuits with about the same facility. "It was discovered, beyond a doubt, that those who were most systematic and workmanlike in the making of working drawings and wooden patterns with hand tools likewise were most successful during their first six months in the machine shop, blacksmith shop, foundry, boiler shop, pipe and sheet metal shop, or wood shop, where they issued, accounted for and used hand tools."[15] The results of this experiment, which were based upon the individual judgments of several instructors and mechanics, suggest that estimations of capacity do not differ very widely when made by persons who understand boys and the industrial activities in question. And when aptitudes and abilities have been determined even tentatively, these can be tried out and developed sufficiently to aid in *educational and vocational guidance* as the try-out courses progress in difficulty. In this way, individual interests, inclinations, and capacities are not only *revealed* but are also continually *checked* and *developed* as the activities become more intensive.

Methods of Offering Industrial-Arts Courses and Projects.

Because of the limited time available (six to twelve weeks in a large proportion of the school systems investigated), there is a tendency for most of these courses to include definite types of work to be done by all pupils. However, this does not necessarily mean that all pupils must develop the same problems and projects, or complete the minimum requirements in one kind of activity before taking up work in another. Some of the industrial departments even allow pupils upon entering new types of work, to choose between several introductory problems at hand, or to substitute work of equal difficulty. This also is the practice of a number of schools in connection with outside projects, after the boys have facility for doing a satisfactory grade of workmanship. In addition to the individual projects and problems, opportunity aslo is given in a number of the schools for trying out qualities of leadership and coöperation in managing construction work and groups of workers. While the student-foreman organization is the plan ordinarily employed to promote this form of group activity, there seems to be very little uniformity at present either in the scheme of organizing or the method of conducting this promising type of work.

The *project method of learning*,[16] which has received such wide interpretation and publicity during the past few years, is favored in principle by over 90 per cent of the industrial-arts teachers in 303 of the intermediate and junior-high schools studied. As would be expected, different degrees of emphasis are given to the relative importance and desirability of having the purposing and planning of the projects done by the boys, especially in the seventh and eighth grades. A few of the instructors still require the boys to work largely from specifications and to do their work in a certain prescribed way, thus allowing little opportunity for each pupil to set up purposes or objectives and to develop plans for meeting the difficulties in their execution and for solving the problems to get results. However the great majority of these instructors are attempting to improve upon this traditional method, which undoubtedly has robbed many boys of the larger values in the educational process by over-emphasizing both the following of directions and manipulative skill in the tool processes.

[14]Thorndike, E. L. "The Permanence of Interests and Their Relation to Abilities," Popular Science Monthly, November, 1912.

[15]Edgerton, A. H., "Diversified Industrial Activities as a Means of Educational and Vocational Guidance for Seventh, Eighth, and Ninth Year Boys." Industrial-Arts Magazine, October, 1917, Vol. VI, pp. 390-392.

[16]Kilpatrick, Wm. H.: Teachers College Record, Columbia University, Vol. 21, pp. 319-335; and Snedden, David: School and Society, Vol. 4, pp. 419-423.

Although the importance of skill and dexterity is recognized by those who have adopted the project-problem method of procedure, it is insisted that a proper amount of technique can be realized and vitalized through profitable experiences which stimulate thinking and reasoning as well as industry.

This method of teaching requires the instructor to analyze, simplify, and adapt subject matter to aid pupils in securing suitable information to meet the somewhat varied situations which arise in their construction problems. In addition to the necessary technical information, which aids pupils in understanding the methods and processes involved in their work, a part of the educational value undoubtedly comes from observing tools in use, samples and pictures of commercial products, projects in various stages of completion, charts of industry, and the like. It also is found desirable to have an abundance of illustrated, descriptive material always available for the purpose of *helping boys to understand and appreciate economic products, allied occupations, and vital relationships in each phase of industry sampled.* When planned carefully, such devices as excursions, motion pictures, class discussions, student reports, talks by specialists, and class or group demonstrations gain the interest and offer possibilities in furthering achievement and success.

The instructor sometimes finds it advantageous to resort to shop tricks and kinks, in order to form the desired bonds in the teaching process. In demonstrating the proper uses of certain tools, for example, he might get the best results in determining habits and attitudes by showing their incorrect as well as their correct uses, in order that the boys may thoroughly appreciate the possible difficulties in the work provided they do not use the tools correctly. The results of experiments to ascertain the best methods for such work show that where boys are made conscious of the trouble which may be experienced or avoided, by using tools either incorrectly or correctly, there are few that do not exercise care to save themselves unnecessary waste in time and energy. "There is a tendency for teachers to depend too much upon verbal explanations, because of the convenience of words and the immediate economy of time that results from their use. If words will give the desired clearness, use them by all means; but, if nothing more than an *inadequate notion* will result from such explanation, the teacher has made a poor choice to get results."[17] Regardless of which one of these methods is chosen for offering a specific unit of industrial arts instruction, it is obvious that an unnecessary waste of time and effort is certain to result from forming wrong habits, inaccuracy, or forming no definite habits at all in the work and study covered.

[17]Edgerton, A. H. "Experimental Work in the School Shop as a Means of Industrial Efficiency." Industrial-Arts Magazine, April, 1915, Vol. III, pp. 161-163.

[18]Contributed by Arthur W. Richards, Director of Manual Arts, Ethical Culture School, New York City.

OTHER SUCCESSFULLY TRIED UNIT-COURSES IN LARGE AND SMALL SCHOOL SYSTEMS.

Eighth Grade Prevocational or Aptitude Courses.[18]

In the eighth grade at the Ethical Culture School, New York City, a plan has been adopted for offering three semi-elective courses which aim to be prevocational or aptitude courses. These courses are known as mechanical, printing, and art-crafts.

They are considered semi-elective because their election is determined by the coöperative considerations of the pupil, his teachers, and his parents and are based partly on his records in the arts courses. The courses are prevocational or aptitude courses in the sense that they are intended to serve as experiences that may help the students find or verify so much regarding their interests and aptitudes as appears desirable, in order to start some thought of high school courses of study and prospective careers. For example, the *mechanical course* is planned for those (1) having some interest in and liking for machinery and a desire to study and experiment along this line; (2) showing some aptitude for mechanical problems and construction; (3) desiring to find out whether they have or have not any real and well founded liking and aptitude for mechanical things.

An appreciation of what is fine and admirable in the art and science of machinery is one aim. The acquisition of a definite body of technical practices and knowledge of elementary metal working processes, tools, and materials is also intended. This course consists of a study of the design, operation, mechanics, and construction of some good and industrially important mechanical project such as the steam engine. The general nature of the content, the organization, and the methods of instruction in this course are briefly as follows:

Instruction cards, charts, and models used are:

1. Steam engine working chart.
2. Gas-auto engine working chart.
3. Operating steam engine, reciprocating and turbine.
4. Operating hot air engine.

Outside study assigned on these special topics with specific references given for each includes:

1. How the steam engine works.
2. Valves.
3. Boilers, types, flash, everyday engineering.
4. Types of steam engines.

Excursions made are:

1. To 59th Street or other power stations.

Social content studies involve:

1. History of steam engine and inventors as vocational inspirational matter.
2. The industrial and social importance of the steam engine.
3. Other power engines and the future of steam engines.
4. Vocations based on mechanical work interest.

Organization plan includes:

1. Class project to consist of a lot of engines which are carried to point of assembling. Individual students are to assemble, adjust, and finish one or two engines from the finished parts.
2. Individuals (1) to be assigned lot part jobs, (2) given problems to solve, (3) assigned duties necessary to advance the project.

Methods of personal instruction are:

1. To be on an individual problem or task basis.
2. To have teacher's demonstration on new, unknown processes made largely to individuals, and class lectures to be very short.
3. To allow pupil instruction to other pupils as the jobs are transferred.

A Practical Record System for Automobile Gas Engine Courses

Geo. Henry Jensen, University of Washington

THERE is no use denying the fact that vocational courses, or rather those designated as industrial courses having for their aim preparation for successful trade entry, have been much criticised and perhaps justly so. However, it is not the purpose of this article to refute criticism. In passing, it may be said that it is frankly recognized that much of the criticism is just. But, on the other hand, it is only fair to state that much criticism comes from individuals who either do not know the facts, or, are not qualified to criticise constructively. Certain work has come to the attention of the writer which is decidedly worth while and in the right direction. The record system of the automobile engine department of the Everett Vocational School is an example. The Everett schools are in charge of A. C. Roberts, superintendent of schools; and by way of introduction it should be further stated that the Everett Vocational School is not separated from the high school and is in no sense a separate trade school, but is organized as a part of the high school under the direction of Mr. L. B. Travers, director of vocational education, in cooperation with the high school principal.

Course Organized on a Useful and Productive Basis.

This course, as in the case of the other vocational courses in this department, is organized on a useful and productive basis. The equipment is quite complete and contains many features not always found in a school shop, not the least of which is a student tool room foreman and a student stock room man. The school depends on cars from the outside for practical classwork. More details in regard to equipment and classroom procedure would be interesting, but that is another story and not the subject of this article.

Realizing that some practical record system, simple enough so that it could be handled by learners when meeting business standards, Mr. Fred McGinnis, head of the automobile gas engine department, worked out in cooperation with the director of vocational education, the following record system which will now be described in detail, reproducing original sheets.

Repair Order.

The repair order, Fig. 1, is made out in duplicate by the instructor when the owner brings in the car. Referring to Fig. 1, it will be seen that it is in the nature of a contract, including a complete statement as to what the owner desires in the way of repairs and service, agreeing to pay for all materials and supplies furnished by the school. He also pays an additional fifteen per cent as indicated in the job record, Fig. 3. This, although not stated in Fig. 1, is explained to the owner of the car at the time that the school agrees to repair same. It is signed in duplicate, the original being kept by the owner. The duplicate, which is yellow, is kept by the school and is handled by the tool room foreman. In all cases the signature of the owner is insisted upon; however, not until the instructor has inspected the car and accepted the job. This is of course necessary for more than one reason, chief among which is to make sure that no jobs are accepted which the boys in the particular stage of the course are unable to repair, and to avoid working on "dead head" cars.

Parts Order Blank.

The parts order blank, Fig. 2, is made out by the stock room man at the direction of the tool room foreman, using as an order or a basis, the duplicate of the repair order, Fig. 1. This blank is made out in duplicate, including all articles not available in the stock room, and approved by the instructor before sending to the motor company who furnishes the supplies.

A good sized stock of standard parts and repairs are kept in the stock room. However, in addition to this it is necessary to send out for additional parts. All of this material is ordered from one company with whom the school has an open account. In the event that parts are ordered which this firm cannot supply, they send out for them and deliver them to the school. The original or white sheet of the duplicate parts order blank is then sent to the "blank" Motor Company, which delivers the articles called for, and upon submitting the bills, attaches them to this parts order blank which serves as a requisition. The duplicate or the yellow parts order blank is sent by the automobile gas engine department to the secretary of the school board, through the director of vocational education, after the parts

EVERETT PUBLIC SCHOOL

VOCATIONAL DEPARTMENT

REPAIR ORDER

EVERETT, WASH. Dec. 12 19[illegible]

JOB NO. 50

INSTRUCTIONS: (write in full all repairs to be made)

Take up Connecting Rod bearings
Inspect main bearings (take up if necessary)
Adjust Service Brake
Grind Valves and clean carbon

You are hereby authorized to furnish all materials to make the above repairs on my Buick automobile, license number 1510 and charge to me.

SIGNED J. E. Walborn

ADDRESS Red 1573

FIG. 1.

Voc. No. 5.

EVERETT PUBLIC SCHOOLS

VOCATIONAL DEPARTMENT

PARTS ORDER BLANK

JOB NO. 50 EVERETT, WASH. 12-16 1919

TO THE SECRETARY OF SCHOOL DISTRICT NO. 24:
PLEASE FURNISH THIS DEPT. WITH THE FOLLOWING ARTICLES:

NUMBER	ARTICLES	COST	CHECKER
6 ft.	Brake Band Lining 2" x 3/16"		
1	Cyl head gasket for Buick Six		
1	Valve Spring for Buick		
	TOTAL		

ORDERED BY Mc Gimme

DELIVERED BY Sheraton Motor Co.

APPROVED Mc G.

NOTICE: ALL PARTS USED IN THE REPAIR OF ANY AUTOMOBILE MUST BE LISTED ON THIS SHEET.

VOCATIONAL DIRECTOR

FIG. 2.

have been delivered and the bill checked by the instructor. In no case does the secretary of the board pay the bill unless it checks with the yellow sheet and the price on the delivery tag, also checked by the instructor.

Job Record.

Referring to the job record, Fig. 3, it will be noted that certain supplies are included under the heading of material not included on the parts order blank, Fig. 2, under the caption "article." These are supplied from the stock room and at the market price. All of the items listed on the job record are entered when the parts or supplies are received from the stock room man by the student workman, and as already stated are charged by the stock room man at the regular retail price. When the owner comes for his car he receives the original of the job record and fifteen per cent is added to cover breakage, tool wear, power, etc., which goes into the Automobile Shop replacement fund. The money is collected by the instructor and turned over to the secretary of the board along with the yellow or duplicate of the job record, Fig. 3, through the office of the director of vocational education.

The labor half of the job record sheet, Fig. 3, is not primarily for the purpose of showing the owner how much he has saved, but is for the purpose of showing the student workman what his time is worth; however, the car owner can see what his bill would have been had it included a labor charge. Referring again to Fig. 3, the first and most advanced workman, Wickers, worked nine hours at 80 cents an hour, while Bartman working eight hours was only worth 70 cents an hour, and Walker working one hour was worth 65 cents an hour. This means that on the particular work

Voc. No. 4

EVERETT PUBLIC SCHOOLS

VOCATIONAL DEPARTMENT

JOB RECORD

Auto SHOP — Buick JOB — 50 JOB NO.

ORDERED BY J E Walborn DATE 12-12-19

WANTED 12-26-19 INSTRUCTOR J. McGinnis

	MATERIAL					LABOR				
NO	KIND	PART	AT	COST	TOTAL	WORKMAN	TIME	RATE	COST	TOT	GR. TOT
1	Cyl	Head gasket		2 40		Wickers	9	@ 80			
						Bartman	8	@ 70			
6	ft	Brake Band Lining		5 40		Walker	1	@ 65			
1		Spring		45					15 45		
2	Gal	Gasoline		48							
1	Gal	Grease		20							
	doz	Washers		10							
	Cotter	Keys		15							
		Bolts		35							
		Nuts		40							
					10 43						
		+ 15%		$	12 00						$ 25 45

Everett, Wash. 12 26 1919

Received of J E Walborn $ 12 00 Dollars

Signed J. McGinnis

NOTICE: Fill out this sheet only after job has been completed and send to the director's office.

Vocational Director

FIG. 3.

assigned these boys on the Buick Job, No. 50, that Walker had not advanced as far in the course as the other two, but that Wickers was able to make *better time*, and still do first-class work, than either Bartman or Walker. It would not be fair to either the boys or the school to say that one did better work than the other since only work which meets commercial standards is permitted. The instructor is a practical workman and has worked in different garages both in the middle west and on the coast, and is therefore able to estimate with a reasonable degree of accuracy what the labor cost would be in a commercial garage.

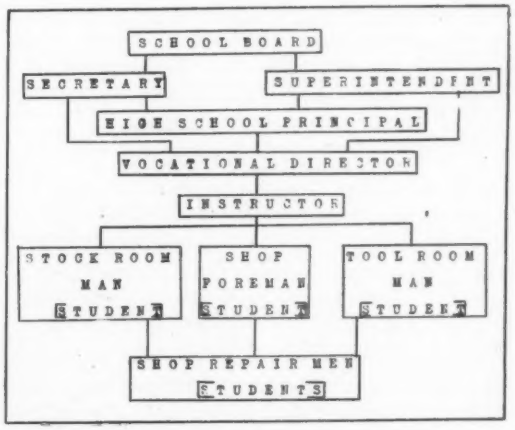


FIG. 4.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN

Editors

EDITORIAL

ART AND MANUAL TRAINING.

Is it too much to expect Art teachers and Manual Training Teachers to cooperate? A few rare examples have led to the hope that such cooperation might become common. We are certain that the difficulty does not lie altogether with either party.

Few Manual Training teachers seem to enlist the help of the Art teacher beyond handy reference to her as the one responsible for all art instruction in the school. This is a responsibility that few Art teachers can meet successfully. The teacher of English can hardly succeed in making good English composition common to a school if other teachers tolerate badly written and spoken exercises. The Art teacher has no authority to see to it that every project in Manual Training be conducted for effect in design, as well as for practice in workmanship. This obligation rests with the Manual Training teacher, and is a necessary part of Manual Training.

On the other hand, the manual training teacher has much to do aside from teaching art, and the opportunity for art instruction in the design of the few projects that can be made, is limited.

When instruction in the various school subjects that involve artistic choice, is properly organized, it may be discovered that the Art teacher should have a hand in each of these courses. This responsibility will demand that the Art teacher be trained thoroughly and broadly.

Few art teachers can teach design relative to various materials and applications. We are well convinced that the only way to teach design is by application to definite problems that involve general principles under particular conditions. The evidence of poor design or of no design at all in Manual Training, is not to be charged to the art teacher, nor to the Manual Training teacher alone, but to the disorganized conditions of our instruction. Until this organization is effected, the instruction will be faulty and ineffective.

TEACHING DESIGN.

The successful teacher of design will have solved many other pedagogical problems with his own. With a subject that is often announced as unteachable, the teacher of design leads his pupils to perform the miracle of design by performing the miracle of teaching it.

With miracles to perform, it is not well to assert that there is only one way. Some would have us teach design with little reference to literal form. Others would have us teach design by constant reference to nature. Some insist that underlying principles should be strongly emphasized. Others assert that underlying principles must be rediscovered by each pupil in his own way, through experiment and experience, before they can govern the operation of design. The names given to effects in design are confusing because they mean different things to different people.

There are two bits of advice that we believe will help in the matter of teaching design. First, we consider it essential to have and to keep the purpose of the instruction clearly in mind. The definite purpose of instruction in design is to lead the pupil to the ability of composing things suitably. The second bit of advice is to bring all possible references on the successful design of similar things, to the observation of the pupil.

First, a definite thing to accomplish, and, second, abundant examples of similar accomplishments, will help much in the instruction of any subject.

Every teacher of design should organize the work into definite exercises for a definite purpose. It is idle to start a class on a still hunt for beauty in general.

Every teacher of design should organize a clipping bureau of designs that apply to the problems attempted. Let the class members help with this clipping. Have them collect good examples of the things they are to design. Help them to classify these collections until they have gained some understanding of how others have succeeded or failed with the problem.

In this day of many publications, it is possible to collect suggestive reproductions of all kinds of design. Such a collection will give definite suggestions to many pupils who otherwise would work aimlessly.

THE NEW YEAR.

Aside from the general assumption of good resolutions, the New Year has little of the significance to teachers that it has to the business world. In the business world, the beginning of a new year is the time for striking a balance. January marks the close of the active holiday season and the beginning of a dull reaction in trade, with most commercial concerns. A lull in business should give opportunity to those activities that relate between business and education, for is it not one of the most common excuses of business that it is too busy for education?

Now is the season for part time and vocational instruction. Now is the time for three months of training on the part of that great army of young men and women who have been employed in the busy trades. Now is the time when trade classes should be organized in every large industrial center which will give instruction to those who must live and learn by the closest economy of time.

COMMERCIAL VOCATIONS.

For a long time there was a kind of unconscious attempt to draw a line between commercial education and vocational education. It seems of recent times to dawn upon people that commercial training was really the first organized and the least organized form of vocational education, especially so far as the schools were concerned.

It is almost the only education that from the very start was frankly and openly and proudly vocational. The commercial teachers, for the most part, have not engaged in a jargon of misunderstandings concerning "general educational values" or "cultural values" or "mental developments." They have been diligently trying, under adverse conditions, to get people ready for jobs. Some of these other things have come along with the commercial instruction, but the main purpose has been vocational.

All other forms of vocational education, and all education for that matter, can take very profitable lessons from the commercial teachers. These people have eliminated useless historical and "introductory" verbiage and have gone directly at the job with methods that really accomplish what they set out to do.

There are probably no subjects whose content, form and method are so completely worked out and so admirably adapted to the purpose as the commercial branches.

Let us heartily welcome the commercial teachers among us. They will bring information and assistance into every gathering of vocational teachers.

FOR THE NEW YEAR.

The spirit of the New Year should be one of confidence. The spirit of the year just past has been one of pessimism.

Business and industry of all kinds depend for their success upon the spirit of enthusiasm and hope which pervades the country. If enthusiasm is low and hope is subdued, business will stagnate. Despondency never begets success.

No better resolution for the New Year could possibly be made than to maintain an optimistic attitude and outlook, to spread the spirit of confidence and hope, and to meet the problems of the year with a cheerfulness and enthusiasm that will not brook disaster nor acknowledge defeat.

LACK OF FUNDS AND THE SCHOOLS.

Lack of funds is the universal excuse now. While lack of funds is not always a psychological condition, it does have its psychological aspects.

In trying to economize, the world has not yet thought of eliminating useless expenditure. People usually begin by trying to cut down on indispensable needs. When the coal crisis arose in the pre-Volsteadean days, many cities closed the churches and the schools and left the saloons open. The first cry of hard times immediately brings a wave of "economy" in school building and in general school funds.

If people would voluntarily give up small, expensive habits even temporarily, and devote the saving to educational purposes, the cry of "lack of funds" would not have to be raised.

The annual cigarette bill in this country would practically run the schools. The cost of food thrown annually into the garbage is probably greater than the annual cost of all the schools.

If we can ever reach the point where we put first things first and subordinate useless or less important things to their rightful places, we can then hope that the schools and the education of our children will have primary consideration.

WOMEN'S WORK.

One of the most significant movements of the times is the liberalization of attitude toward women and the recognition of an enlarged field for women's work.

Only a short generation ago, the sphere of women's work was confined to the home, to the schoolroom, and to a few semi-domestic and clerical lines of occupation. The first attempts at liberalization in the schools could go no further than cooking and sewing, still with the bent of domesticity.

This was a good start and the bent was good, but the conception was pitiably narrow.

Even under the handicap of tradition, women were suddenly found to be invading various fields of employment, until an investigation of a few years ago revealed women in almost all of the constant occupations.

The war, of course, gave great impetus to this movement. Women were finally *admitted* to have the ability and the adaptability in various lines which they had long been known to possess.

The public schools have yet to recognize in any adequate way the genius and the versatility which womanhood has shown in countless ways. It remains for the public schools in the next few years to meet the demands of young womanhood for opportunities in the various mechanical, industrial and professional fields where their talents may find satisfaction and reward.

This ideal in no way detracts from the fine ambition that young women should have training as home-makers. There is room for all of it. The home-making courses are to be strengthened and girls are to be better prepared as home-makers than ever before, but at the same time, they are entitled to whatever training the schools can give them for the time preceding and following the home-making period.

Not only the industrial educators but the commercial, the art, and the general school educators must accept the situation and stop playing with imaginary educational projects. Perhaps a note of warning to our industrial educators is timely; that when we announce our big lists of things made in our school shops and our extensive program of producing machines and other equipment, either for the school departments, or on contract, we must not forget that all this is our by-product—the trained worker —not forgetting also that this applies to the successful worker in every field of life, the shop, the farm, the office and the profession.

It makes no difference whether this be done in the part-time school, the all day school or the corporation school—we dare not trifle. When we "boast" let it not be of the work we turn out, although the work is necessary, nor of the money we are saving the school district, which admittedly, is a convenient means to an end, but let us look to the individuals we are training that our real product may be the highest quality possible.—James C. Tucker, Bethlehem, Pa.

Nothing intensifies interest so much as to endeavor to do a thing yourself; nothing arouses attention and clear observation like handwork in all the arts and crafts.—Francis W. Parker.

The Marimba -- A Problem in Science and Industrial Arts

L. A. Herr, Supervisor of Elementary Industrial Arts, the Lincoln School of Teachers College

The particular problem to which this description relates developed in connection with work in music and with a trip which a class took to the Metropolitan Museum of Art, New York City, to observe musical instruments. Therefore a brief description of the materials seen in the museum will help in an understanding of the problem.

In the Crosby Brown collection of musical instruments[1] may be found materials appealing to a wide range of interests. In this collection there has been assembled instruments of every kind from almost every country and island of the world. The struggle for musical expression is here told in material form. From the crude efforts of savages to the highest developments of our time the series of instruments is complete. The extensive collection is classified and arranged not only by world regions, but also by technical groupings based on materials of construction and methods of tone production.

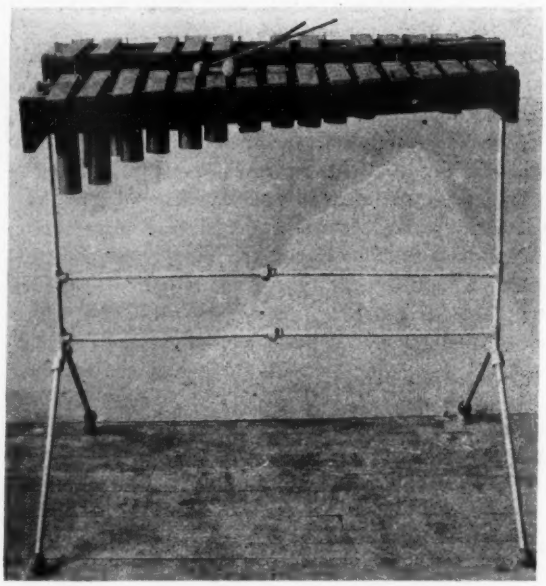
The pianist, the violinist, and the lover of the band and orchestra, will find here his favorite instrument with its parts so separated and labelled as to disclose the inmost secrets of construction; the artist will discover on the decorated drums of savages inspiration for line and color; the historian will read here a record of struggle and development in overcoming mechanical difficulties in the achievement of certain ends; and the scientist will see numerous applications of scientific laws in mechanics and sound production.

This collection has for several years been a source of inspiration and suggestion for the experimental music[2] work in the elementary classes of the Lincoln School. It was through the interest in that work, as well as to an interest in industrial arts that the marimba shown in the accompanying illustrations was made.

In the collection mentioned, many examples of this type of instrument are to be found. In their construction great variety of materials and many ingenious methods have been employed. For bars,[3] the visitor may see stone, glass, metal and wood; for resonators, gourds, earthern jars, bamboo, hollowed limbs of trees, and square built wooden tubes. The sizes of these instruments range from a tiny instrument capable of producing a mere tinkle, to huge structures several feet in length, whose notes might resound for miles. It is not our purpose, however to discuss either the merits or the history of these instruments, but to indicate merely, the source of the suggestion resulting in the construction of the one here described.

This instrument was made by two ninth grade boys during their regular shop periods. Additional time was given by one of these boys who worked one Saturday to make the iron pipe support. The material used in making the bars was a few strips of nagaed[4] wood, $1\frac{1}{2}''$x$\frac{7}{8}''$, donated by an instrument maker. In order to provide lengths sufficient for two and one-half chromatic octaves, this material was sawed into strips about $1\frac{1}{2}''$x$\frac{3}{8}''$.

A three note marimba sounding the tones "g", "a", and "b", was used as a pattern for determining the length of the first bars. After a few bars had been cut to length and the correct tones approximated, it was a simple matter to extend the range for lower and higher tones. The boys quickly discovered that shorter bars produce a higher pitch and that thinner bars produce a lower pitch. By applying these two principles, the boys were enabled to tune the instrument. If the pitch of a bar was too high, planing the underside of the bar lowered the pitch. Since the removal of a single shaving often produced a perceptible difference in pitch, considerable care had to be taken to cut thin shavings and to make frequent tests. If the pitch of a bar was too low, sawing a thin piece from the end of the bar raised the pitch. It was soon apparent that the quality of tone produced was changed by supporting the bar at different points and by striking it in different places. This made necessary an explanation of the principles underlying the vibration of a solid, and of the significance of nodal points. It was found that if a bar rested on nodal points, approximately one-fourth the length of the bar measured from the ends, the best tone was produced. These points were located separately for each bar before the small hole for the nail which keeps each bar in place was bored. The boring of the hole at the nodal point produced no perceptible change in pitch. To support the bars two bridges were made of poplar covered with strips of builder's felt. Into one of these bridges nails were driven to keep the bars from moving endwise; into the other escutcheon pins were driven to prevent lateral movements. The protruding portions of the escutcheon pins were cushioned with rubber tubing capped with rivet heads. The latter made a better bearing on the upper end of the tubing, and provided a bigger head for fastening the cords which pass above the bars.



THE MARIMBA AS MADE IN THE AUTHOR'S SHOP.

The resonators were made of brass tubing cut into graduated lengths. Each tube has a volume proportional to the pitch of the bar under which it is suspended. The exact depth of tube needed to produce the greatest resonance was secured by pushing tight fitting corks into the ends of the tubes the required distance. The tubes were held in place by means of wire hooks, suspending them between bars of strap iron. The frame was made of $\frac{1}{4}''$ soft black iron pipe, joined by means of the usual fittings. It was finished with aluminum paint. The playing mallets, and the ball-like feet, added for appearance, were turned on the lathe.

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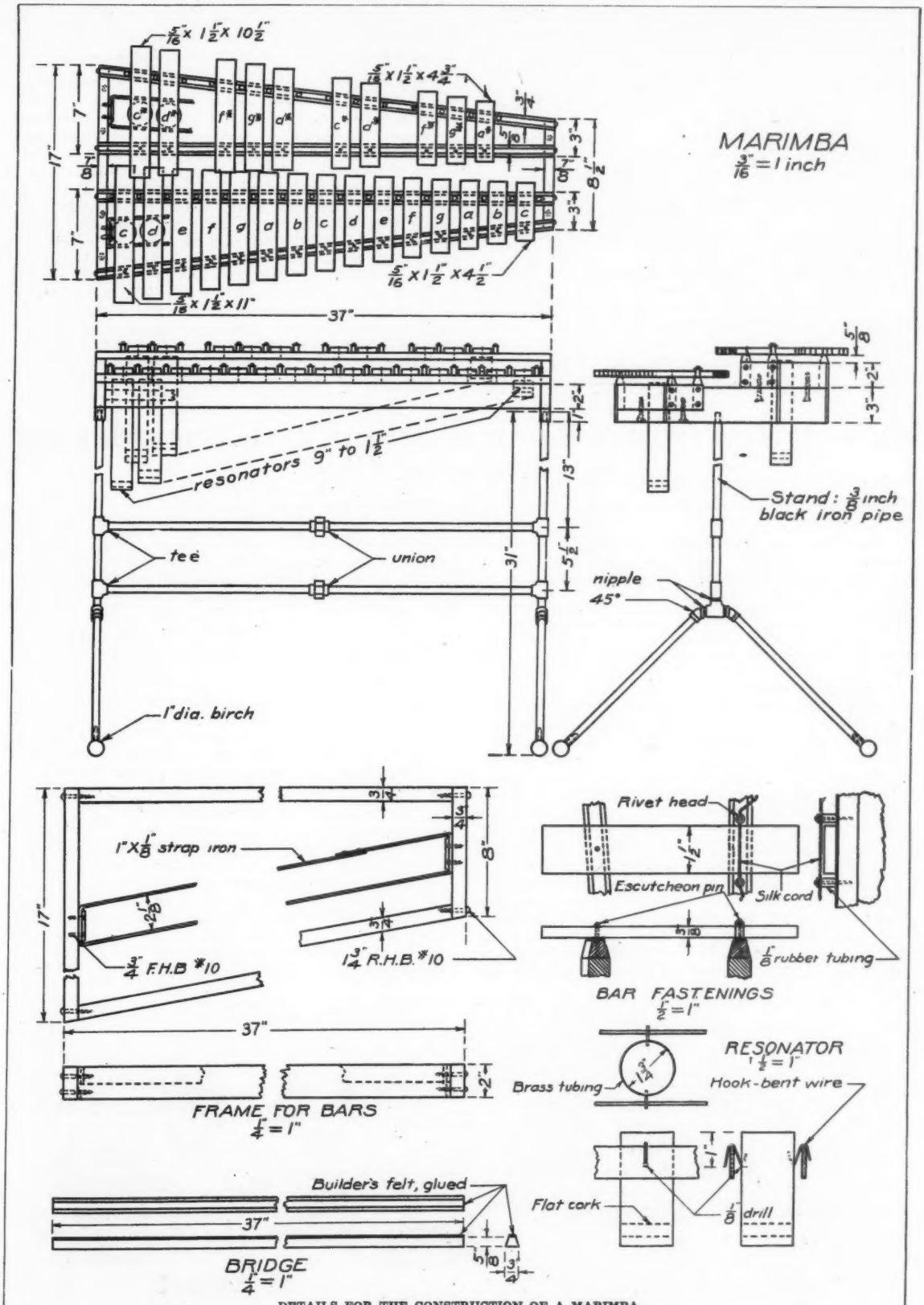
[1] A special collection of musical instruments, collected and donated to the Metropolitan Museum of Art, by Mrs. John Crosby Brown.

[2] Work involving the making of instruments under the special instruction of Mrs. Satis N. Coleman.

[3] See illustrations.

[4] A species of rosewood. Yellow poplar produces a better quality of tone than other woods usually found in school shops.



DETAILS FOR THE CONSTRUCTION OF A MARIMBA.

The instrument has been regularly used in the school orchestra, playing middle and occasionally solo parts. It is also used in the music classes to which reference was previously made. As a finished product it has been of great use in our school. I should like to state, however, its possibilities in supplying teaching materials. The following topics may be enumerated:

In the subject of physics: (1) Sound production in solid bodies; (2) Intensity of sound; (3) Quality of sound; (4) Resonance; (5) The tempered scale.

In the subject of music: (1) The chromatic scale; (2) Tuning of the scale; (3) Staff notation; (4) The piano key-board; (5) Increased appreciation of music and musical instruments.

In the subject of shopwork in wood: (1) Planing and squaring; (2) Construction of joints. (Butt, remate, dovetail, dowels, or screws, might be used); (3) Use of mitre square; (4) Wood finishing; (5) Wood turning, cylindrical and spherical work.

In plumbing: (1) Measuring; (2) Cutting; (3) Threading; (4) Assembling with standard fittings including the union; (5) Enameling.

In sheet metal: (1) Sawing; (2) Drilling (3) Annealing; (4) Bending; (5) Riveting.

Our study of the marimba is merely an instance of the usefulness of much material that might, at first thought, seem only remotely related to our classroom problems. We do not, as a rule, expect to find in art museums the materials for science and industrial arts. Yet, in our problem, this unlikely source provided us with materials of exceptional value. In every community it is more than possible that some equally unlikely source of supply may provide useful teaching materials. Some teachers might find the marimba of value in teaching the skills enumerated; others might find it useful in giving added experiences in skills previously acquired. In the selection of the subject matter it is the judgment of many teachers that the problems selected should, in addition to meeting the needs of the class, have large social work, and should extend beyond the narrow limits of the usual textbook classifications. The marimba combines in a high degree, all these desirable features.

How a Newspaper Contest Stimulated Toy Making in Oklahoma City

Bess Eleanor Foster, Art-Supervisor, Oklahoma City Public Schools

The Oklahoma City Times of Thursday, November 4th, 1920, contained the following announcement:

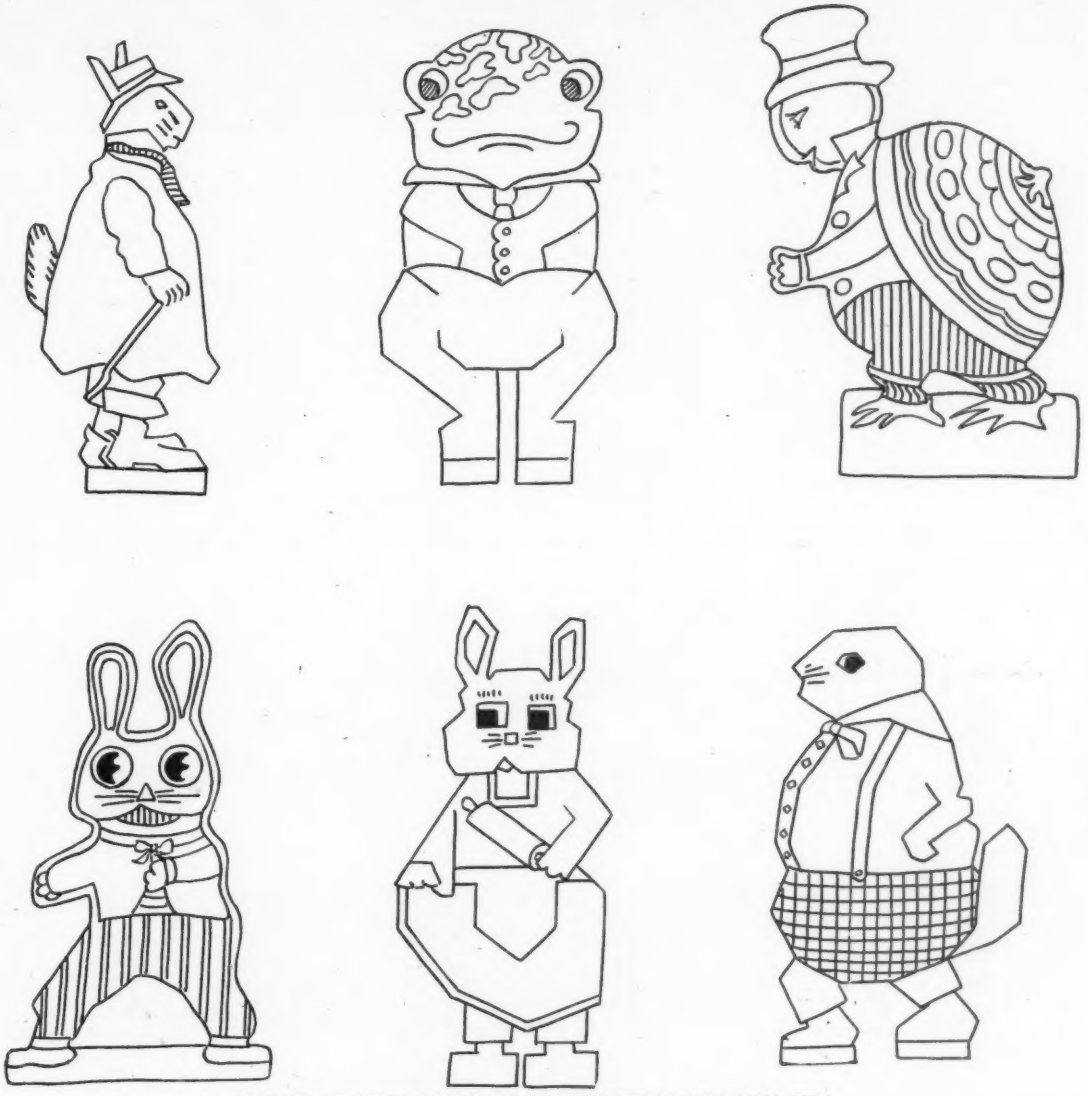
"Here's big news for the boys and girls of Oklahoma City! Peter Rabbit, Buster Bear, Joe Otter, Billy Mink and the other dwellers of the Green Forest in Thornton Burgess' famous bedtime story feature that appears on the back page of The Times every evening, have decided to have a drawing contest and they are going to give worth while gifts to every boy and girl who excels in drawing these famous animal characters."

Here in brief was the plan worked out by the managing editor and the art supervisor: grades one, two, and three were assigned freehand cutting or drawing. Grade four was asked to do freehand drawing. Grade five was given a design problem, the animals to be placed within an enclosing oblong and the background spots cut out, the design touching at top, sides and bottom and thus being held within a frame. Grades six, seven and eight were asked to make original designs for wooden toys. Drawing in all grades was to be done in black and white.

Fifteen sketches of the little "Green Forest Folks" were made by a Times staff artist and published for three days in groups of five. These sketches were used as a basis from which the school children did their classroom work. The contest covered a week's work during the regular art periods. A committee of teachers was appointed in each school to select the best pieces of work from the boy's drawings and also from the girl's drawings, from each lesson through the fifth grade. Above the fifth grade the three best designs from both boys and girls from each lesson were sent to the supervisor's office. The work sent in from the entire school system was then judged by a committee appointed by the managing editor of the Times. Five splendid prizes were awarded from each grade from the first to the eighth inclusive. A pair of moving picture theatre tickets was given for the best individual work, age of contestant considered in every room in every school in the city. Names of all prize winners were published. From day to day there appeared in the Times the pictures of the first prize winners in each grade together with the drawing which won first honors.

The art supervisor selected forty of the best designs from grades six, seven and eight. These were mimeographed and turned over to the head of the manual training department, who in turn gave directions and a set of patterns to each manual training teacher. The toys were then cut out by the sixth grade boys as their regular shopwork, each boy cutting as many animals as time permitted. The toys were now turned back to the sixth grades and painted and finished by the boys and girls during their regular art periods. The toys found a ready sale at Christ-

A FEW OF THE TOYS SUBMITTED IN THE CONTEST.



OUTLINES OF WOOD TOYS MADE BY CHILDREN IN OKLAHOMA CITY.

mas bazaars which were held in almost every school building.

This contest was conceded by all to be a success and an activity which brought much joy into the regular routine of school. For did not the children have a chance to indulge their fancy right in their own classrooms? In imagination they were included in many adventures with Peter Rabbit and his comrades who live in the Green Forest. At the same time, they were making fine, large freehand drawings, cuttings and designs, and getting in a sugar coated dose just what the art supervisor wishes to have developed, i. e., development of skill through freehand drawing. Add to that interest at white heat and what more is to be desired?

One issue of the Times informed the readers that a portrait of Hootie, the Owl was to be found on the cement sidewalk in front of the Emerson school; two blocks north was another in red chalk. Still farther along was a picture of Sammy Jay. Obviously the conclusion drawn was that the young artists who were students at the Emerson school had received their inspirations during the Peter Rabbit drawing classes. A little girl seated in one of the study rooms at the Eugene Field school remarked, "I've tried 'steen Peter Rabbits and I can't get his whiskers on straight."

In drawing the designs, boys and girls in the upper grades realized that they must think in terms of wood; their drawings must show sturdy figures which could be made into toys and could not easily be broken. With this idea in mind, the young designers chose the turtle, rabbit, and other animals which have thick arms and legs and which were not in danger of being broken in the process of cutting in the manual training shops.

When it came to the painting and decorating of these toys, an iron-clad law was handed down by the art supervisor. The law was that these toys were to be problems in design and were to be treated decoratively. No attempt was to be made to imitate natural colorings, or to render the toys life like. Toys were to be decorated with complementary color combinations, or analogous harmony of one intense color with neutrals. Thus all toys were treated as design problems and all color schemes were definitely related to the color chart. The instructors who supervised the painting had the children plan color schemes on paper before painting on the wood. Painting was done with high grade opaque water colors finished with varnishes. The workmanship far eclipsed that of many of the rudely daubed toys that flood the market at Christmas.

It was not our purpose to make any great profit on the sales. The toys were sold at a small profit, so that

the children might see their own work sold as a commercial product and that the families of school children and the public might be made to realize that children can do practical, useful work.

Toy making is as old as the world but has only recently become a science. The toys most worth while are those made by children in their own workshops. For does not each toy represent a triumph over difficulties? From now on, no child in Oklahoma City can look at a toy without a deeper understanding of it and without speculation as to who designed it and how.

HOUSE BUILT BY VOCATIONAL CLASS

E. P. Fait, Vocational Director, Everett, Washington.

A seven room bungalow built by the carpentry class 1920-21 of the Washington high school, was planned in the month of September, and completed by June 1st of the following year.

The boys under Mr. Jacobsen's instruction began the construction of this house in September and had it completed by June 1st. This work was carried on under the Smith-Hughes plan, thus allowing the class three hours of construction work each day. Everything that is included in the carpentry trade in the house, including the foundation, has been done by the boys. The class built their own forms, mixed and poured the cement. Lathing, plastering, plumbing and painting, however, were done by men from the trades, hired by the owner.

HOUSE BUILT BY CARPENTRY CLASS 1920-21.
E. P. Fait, Vocational Director, Everett, Washington, Schools.

The house is twenty-six feet by forty-eight feet. The living room is thirteen feet by twenty-five feet and contains a fireplace and built-in bookcase. The dining room is fifteen feet by fifteen feet with four casement windows. The kitchen is fitted with all up to date conveniences including sink, built-in bins, cabinets, cooler, and concealed ironing board. There is a breakfast nook with table and built-in seats. Just off the back porch is a wash room with stationary tubs. There are two bedrooms downstairs and two upstairs. The bathroom is at the foot of the stairs and opens into a small hall which leads to the bedrooms and living room. Oak floors were laid in the living room and dining room. All floors were scraped and sanded.

Our Smith-Hughes class in electrical construction did all wiring and hung the fixtures. The boys also built a woodshed and garage. The garage was their first job and was completed in twenty-seven hours, thus affording a tool and storage room for the class during the completion of the house.

The boys as a part of their training got prices and did the ordering. The owner paid the bills. All bills were worked out and carefully checked as part of their related mathematics course. The plans were drawn up by the boys in their related drawing and sketch periods. Models of roof, stairs, etc., were worked out and built in their theory class.

Building sites are chosen as near the school as possible in order to avoid waste of time going to and from the job. No compensation is received by the boys other than the experience and training they receive on the job. We expect to build two houses this year and under Mr. Jacobsen's expert guidance have one house almost enclosed ready for plastering. While the plaster is drying the second house will be started.

In addition to carpentry we are running vocational classes with related subjects in automobile repair, machine shop practice, and electrical construction and repair. The automobile department takes in cars from owners about the city. Repair work is free of charge, the owner paying for parts only. The machine shop boys have about finished some power grinders. They expect to start soon on electric motors. These will be wound by the boys in the electrical class.

USING THE IDLE HOURS—A SUGGESTION TO SHOP TEACHERS.

Claud Baird, Stillwater, Okla.

"Idleness is the devil's workshop." Such were the words I used to hear my mother say when urging some loitering youngster along the uncertain pathway of knowledge. A number of years have passed since those days when I was a barefoot boy attending a Kansas country school, but somehow the old, threadbare expression has to me a new meaning after teaching manual training for several seasons.

The boy who really does something worth while need have little fear of the future, but that boy who just does nothing has much to be anxious about. A boy from one of the well-to-do homes of this city delivered papers after school last year. I oveheard some of his schoolmates joking him for working for such a small wage. He replied that he knew that it was not much he was getting but he thought it was better than loafing like many of the boys were doing. The habits that this boy is forming are worth more to him than he realizes. He has kept busy

doing something. He is learning to be industrious and thrifty, and I'm quite sure these habits are worth much more than many Oklahoma oil wells.

The surplus energy of the boy must be utilized if we teachers train him as we should. Every boy should either enroll in some phase of shop work in school, or have after-school duties that will give him the needed exercise and lessons in industry that he needs. The school gymnasium and the athletic team can do much but after all their function is to promote play and through this activity to give needed physical exercise. The boy should have some insight into the realities of life. He should learn to *work* as well as play. He should also learn to enjoy his work.

I do not believe that the boy should be deprived of his play, but boys like to use tools and to shape materials as well as shoot goals and make forward passes. Some, I know, like the beautiful piece of work they have created in the shop, as much as the cheers from the side lines.

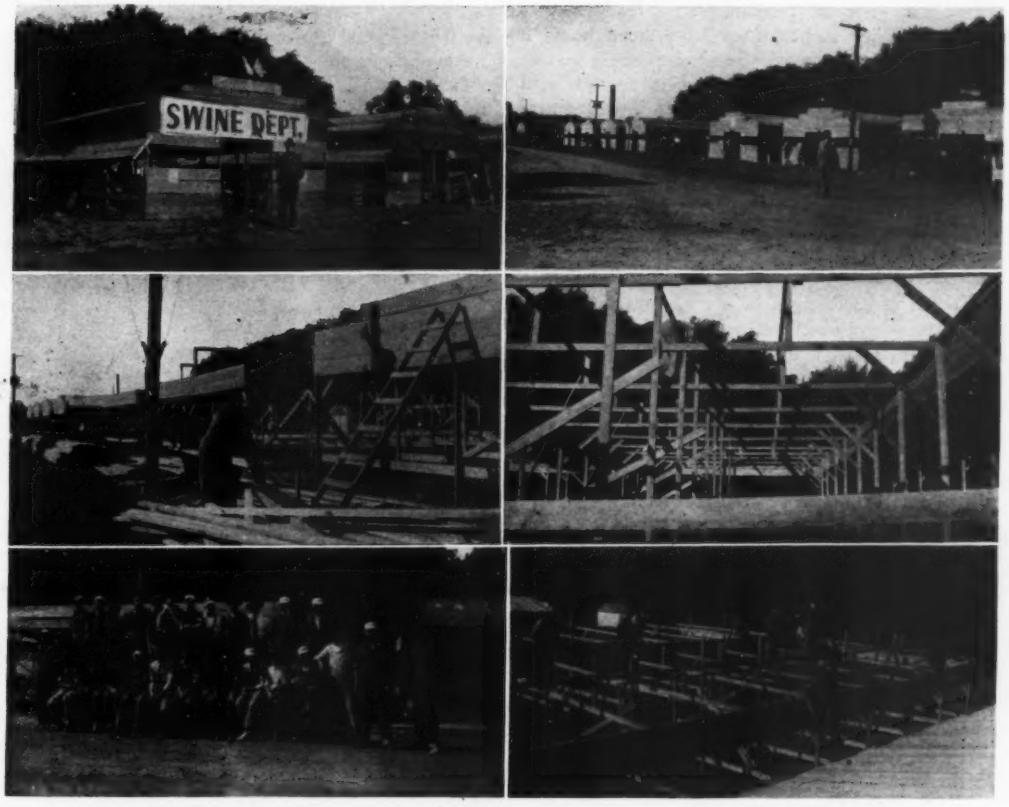
Many hours have I spent in the school shop of evenings and on Saturdays because some of the boys have preferred to work in the shop instead of roaming the streets. And may I add, it was about as enjoyable to me as to them.

It is after all the heart-to-heart chats we have with the boys after class that insures their confidence in us. If you cannot throw off the cloak of dignity and let your students know you as you really are, you have little business acting as their leader and instructor. In the late war it was those officers who didn't dare let their men know them personally, that failed to meet the test. With the confidence and good will of the boys in your classes you can do much; without it your success is very limited.

A SUCCESSFUL PROJECT IN FARM MECHANICS.

The illustrations above show a group of temporary buildings planned by Mr. L. H. Alberty and constructed by the classes in farm Mechanics of the Winfield, Kansas, high school, for the Cowley County Live Stock Association. The buildings were erected as a regular project of the class and as a means of helping a worthy community undertaking.

Of the eight buildings which were erected, three measure 20x70 and five 24x70. The work was very carefully laid out in advance of the actual construction, and when the boys finally began the erection, they completed one building every morning during a three hours' period. The lumber was rented at $5,000 per thousand feet and was returned to the owner. Pieces which had to be cut were sold at a discount. The buildings were roofed with boards and roll roofing, which was nailed and battened with laths at the edges, so that the rolls were damaged to the least extent and were salable at a discount.



BUILDING PROJECT CARRIED OUT BY STUDENTS OF MR. L. H. ALBERTY, WINFIELD, KANS.

The buildings were occupied during the first week in October by a County Live Stock Show.

A total of 43 boys making up the two classes in farm mechanics did the work.

The farm shop department of the Winfield high school has for several years undertaken large jobs as a part of the practical work of the year. During 1920-21, the class erected a cow barn on the school farm, and a green house. In each case the planning was done and the work was carried on under the supervision of Mr. L. H. Alberty, head of the Manual Arts Department.

Three Departments of Smith-Hughes Work. The Newton high school at Newton, Ia., is the only high school in the state to have three departments of Smith-Hughes work. In addition, the schools are reimbursed for night school classes conducted two nights a week.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

HEAD RECEIVER

A. F. Ryan, Trenton, N. J.

The telegraph key and sounder have stood many a battle but are still going strong. The use of these instruments, as far as we can discover, has been mostly with boys in one room. That is, there are few cases where wire has been strung to any distance. For more fun and actual learning of the code, this Head Receiver is offered. First, because it is quiet and a little like "wireless". Second, it is a simple problem in electricity, bringing out magnetism and insulation. Third, it is a good problem in metal and woodwork. Fourth, it is very low in cost. It is a problem for Seventh, Eighth and Junior High boys.

All material to be brought in by the boys themselves except the wire, screws and washers.

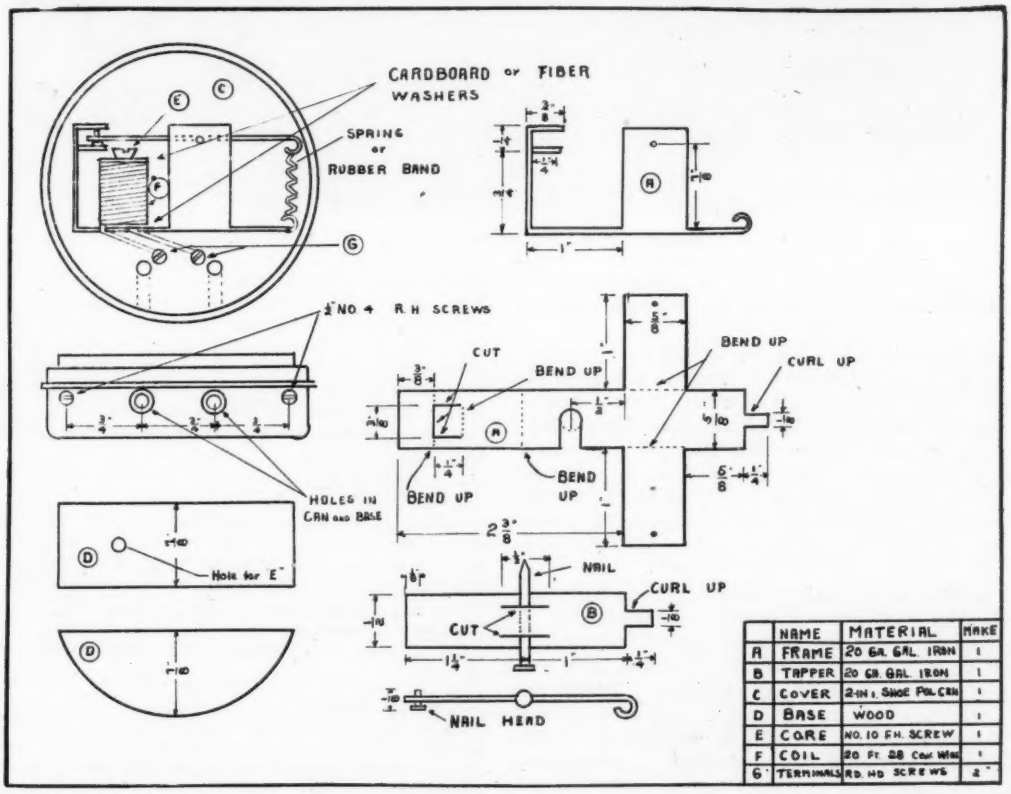
The illustrations show the instrument unassembled, assembled and in use.

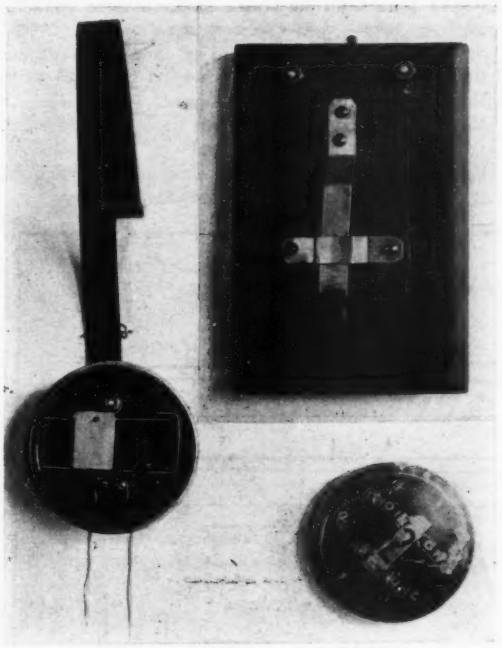
The Key needs no description other than to say that it is mounted on a block 6″ by 4″ and the metal parts are from box strapping known to trade as "band iron". Knob is a piece of dowel. Terminals 6-32 Rd. small Head machine screws 1¼″ long.

Case, a "2 in 1" or like size shoe polish can—clean inside and sand off paint from outside. Drill two ¼″ holes ¾″ apart in lower half, as near the ring as possible. Drill two ⅛″ holes 1″ to right and to left of the ¼″ holes. These are for ½″ round head screws. Black enamel finish is used inside and out.

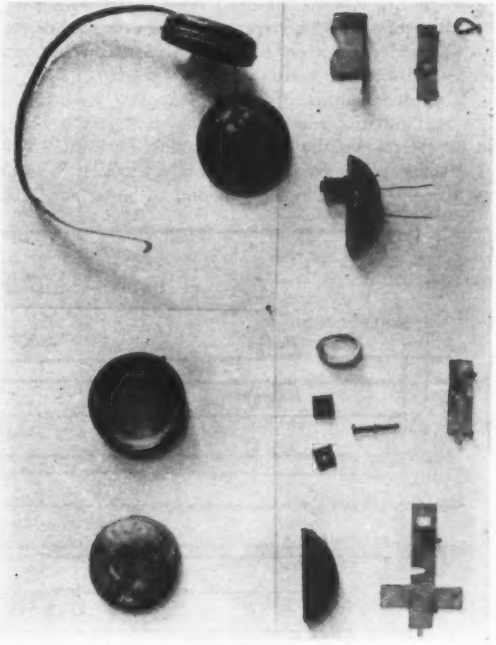
Strap, for lead made from a piece of bank iron, bolted to back of can.

USING THE RECEIVER.


CARDBOARD or FIBER WASHERS
SPRING or RUBBER BAND
NO 4 R.H SCREWS
CUT
BEND UP
CURL UP
HOLES IN CAN and BASE
Hole for E
NAIL
NAIL HEAD
NAME MATERIAL MAKE
A FRAME 20 GA. GAL. IRON 1
B TAPPER 20 GA. GAL. IRON 1
C COVER 2-IN-1 SHOE POLISH CAN 1
D BASE WOOD 1
E CORE NO. 10 F.H. SCREW 1
F COIL 20 FT. 28 Cot. WIRE 1
G TERMINALS RD. HD SCREWS 2



RECEIVER AND KEY.



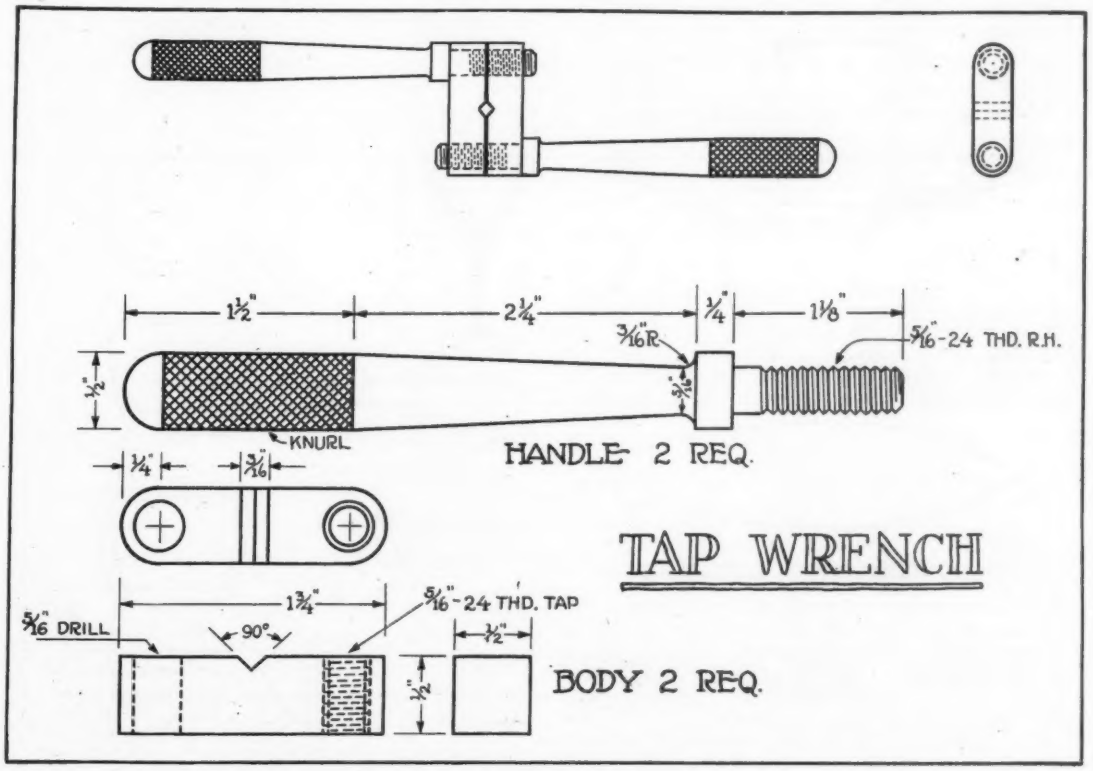
PARTS OF THE RECEIVER.

Base, a curved piece of soft wood $\frac{3}{4}$" or $\frac{7}{8}$" thick, $\frac{7}{8}$" high, made to fit inside of can. Drill two $\frac{1}{8}$" holes in base so that they will come in centers of the $\frac{1}{4}$" holes in can. These are for the wires to pass through to the terminal screws. Stain or shellac finish.

Frame, No. 24 or 26 galvanized iron cut and bent to measurements. One piece of galvanized iron 4"x2$\frac{5}{8}$" will make frame and Tapper. Frame is designed to be easily removed without disturbing magnet.

Tapper, a piece of iron as above, cut to measurements for axle and spring. A nail head is soldered in end of the tapper as shown, to increase the tapping noise.

Axle, a No. 17 flat head nail 1" long placed through uprights of frame and through tapper, so that head will come at back of can. This will prevent it becoming loose.



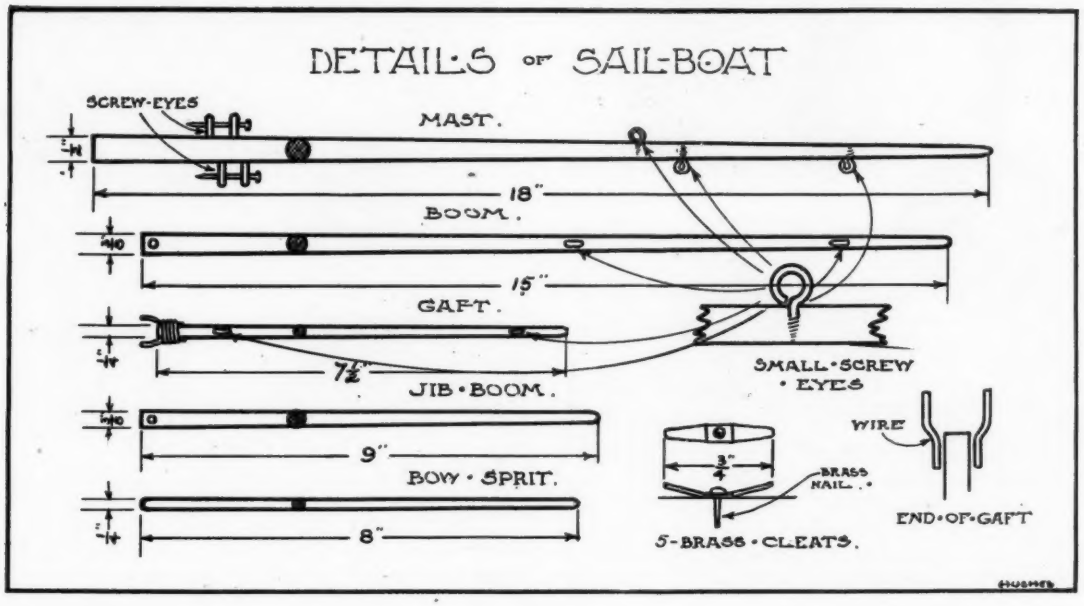
Magnet, a No. 10 flat head wood screw with two fiber or cardboard washers $\frac{1}{8}$" square. Bore one washer for top with 3/16 drill and lower one with $\frac{1}{8}$" drill. Wind with 20 feet No. 28 magnet wire.

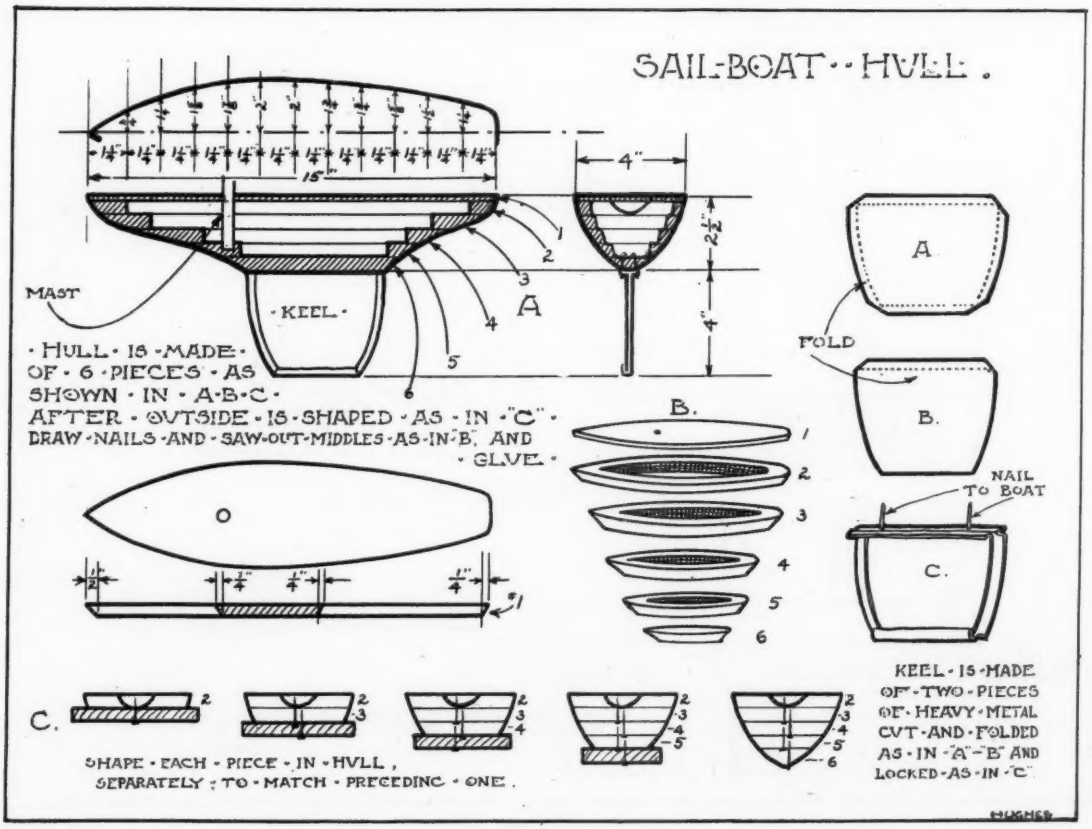
Make the magnet by placing the two washers on the screw and putting screw into base so that the head will just be cleared by the tapper, when it is down. The use of the screw gives an adjusting feature which is so necessary to meet the difference you find in boys' work. When winding is done slide the frame under bottom washer, as shown.

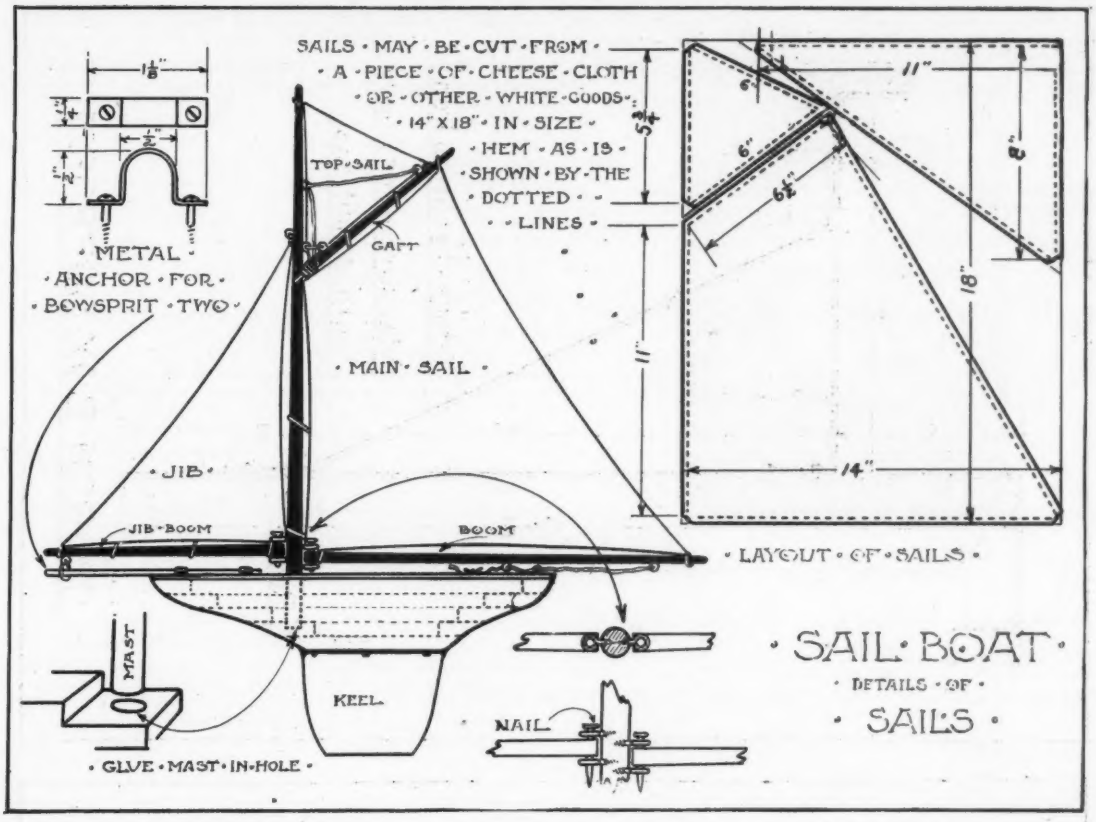
Spring, a small rubber band or large one cut down and tied. Care must be taken to adjust the band so that it will just lift the tapper when current is released.

Metal tools needed—shears, flat nose pliers (for bending) $\frac{1}{4}$" chisel and drills mentioned.

Power can be taken, for one pair of Receivers, from one dry cell or even a ten-cent-store lamp battery.






SAILS · MAY · BE · CUT · FROM · A · PIECE · OF · CHEESE · CLOTH · OR · OTHER · WHITE · GOODS · 14" X 18" · IN · SIZE · HEM · AS · IS · SHOWN · BY · THE · DOTTED · LINES ·
TOP · SAIL
GAFF
· METAL · ANCHOR · FOR · BOWSPRIT · TWO ·
· MAIN · SAIL ·
· JIB ·
JIB · BOOM
BOOM
MAST
KEEL
· GLUE · MAST · IN · HOLE ·
NAIL
· LAYOUT · OF · SAILS ·
· SAIL · BOAT ·
· DETAILS · OF ·
· SAILS ·
11"
6"
6"
6½"
8"
18"
14"

TAP WRENCH.

Edward Moeser, Instructor Machine Shop Practice, Depew High School, Buffalo, N. Y.

The tap wrench is made of cold rolled steel. The handle is a five-eighths piece centered and turned to one-half inch diameter. The piece is then knurled half way and then the taper is turned on. The end is then turned to five-sixteenths for a standard thread of eighteen threads per inch or twenty-four threads per inch. It depends upon what kind of tap the instructor has in the shop. The body is made of 2 pieces of half inch key steel. The slot or V can be put in on the shaper or the milling machine. This size will hold a tap to three-eighths inches. The wrench can be made to hold larger taps by increasing the size of both handles and body.

A SAIL BOAT.

F. C. Hughes, Spokane, Wash.

The well made and attractive sail boat is always a source of pleasure to the boy. And even to the grown-up it many times has not lost its interest. This is especially true of the ones living on or near the larger bodies of water.

The sail boat is not a difficult project for sixth or seventh grade boys, if planned and handled in the right way, for in its construction will be found a variety of tool operations such as are found in those grades.

Hull. In making the hull any really soft light wood may be used. It may be noted in the drawings that the hull is made in half inch layers or sections, making the shaping and hollowing easier for the boy. The outside of the hull should be entirely shaped before the inside is done. When ready, glue these sections into place and clamp in a vise over night, to dry.

Keel. The keel is shown in the drawing. After it is bent and shaped it may be fastened on the assembled hull with shingle nails or other large headed nails.

Masts. The masts make excellent exercises in cutting dowels and should be planed from spruce or other tough wood.

After the hull, keel and masts are all assembled the whole should be given two or three coats of bright colored oil paint. It is suggested that the hull be painted red and the masts gray.

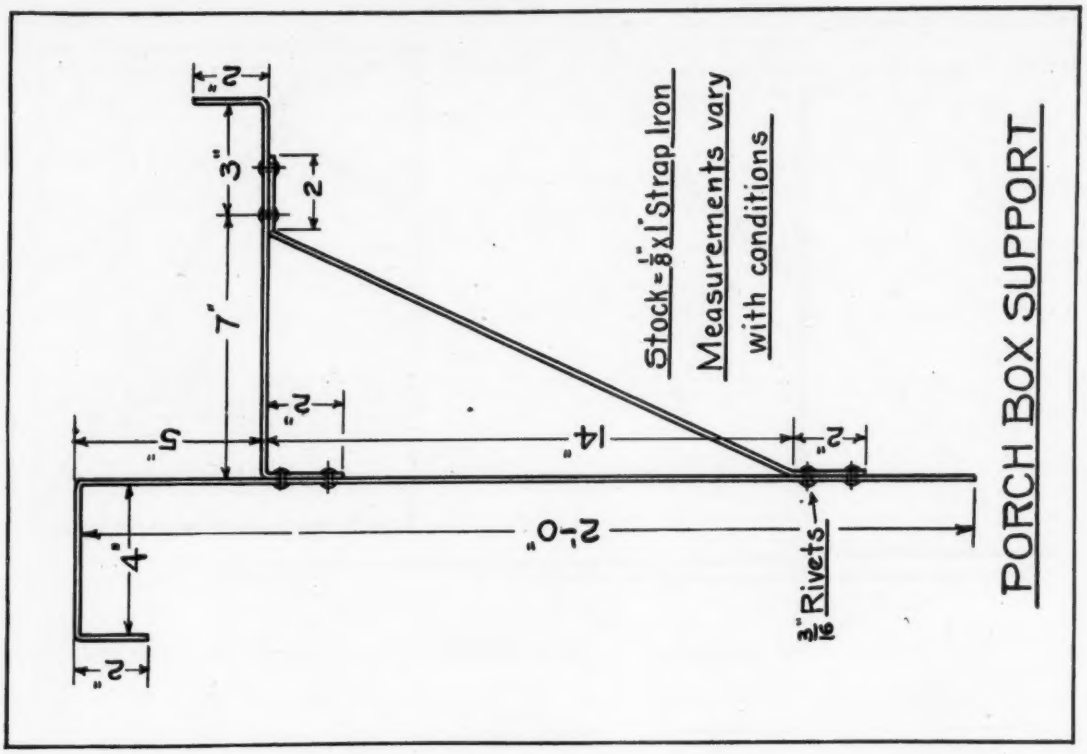
The hull and main mast are the most important things in boat construction. Any plan may be followed for the rigging, either those given in the accompanying drawings or other good ones.

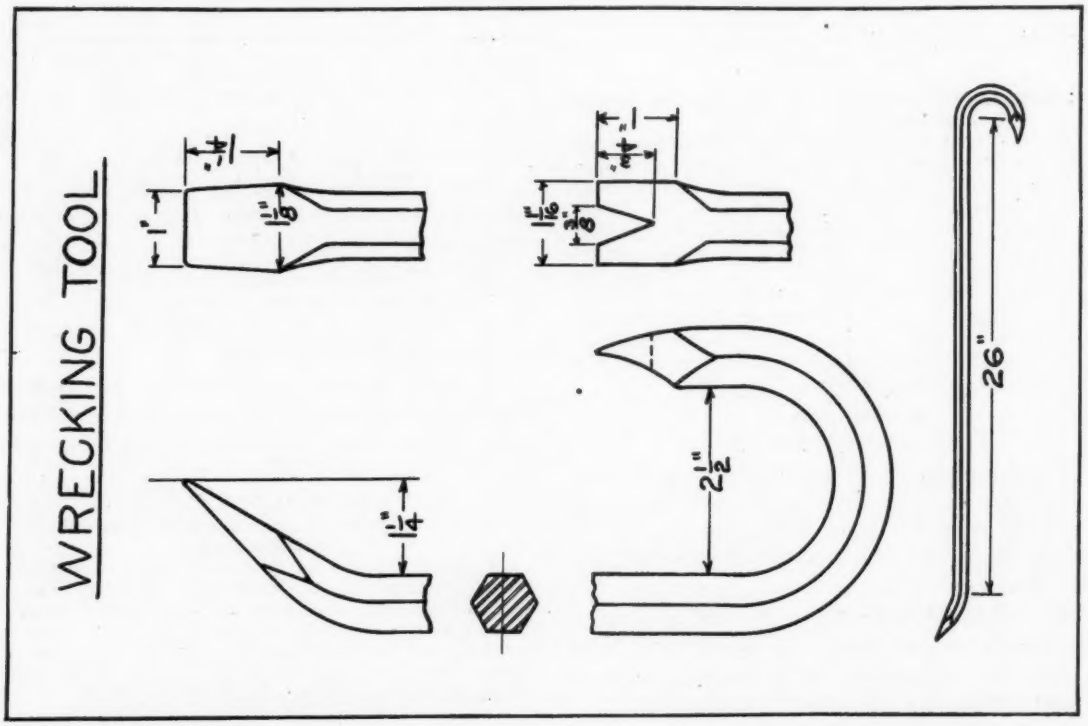
A SUGGESTION FOR ECONOMY.

P. I. Skopp, Director of Industrial Education, Norwich, N. Y.

A good project for the shop and a lesson in economy—as well as geometry—may be arranged by buying amber-edge straight edges and having the boys make T squares. The straight edges should be two inches longer than the blades desired for the T squares and the heads may be made of any available, hard cabinet wood. The saving will be fully $9 on eighteen T squares.

Exhibit Craft Work. The Carnegie Institute of Technology, at Pittsburgh, recently held an exhibit showing the use of art in the crafts. The display consisted of twenty cases of various pieces of work, with illustrations of their making. The work included Japanese ivory carving, European embroidery, oriental rug weaving, Persian pottery, carving from New Guinea, chased and inlaid work, and Grecian vases.





TWO PROBLEMS IN FARM WOODWORK.
Eber L. Moore, Connersville, Pa.

3. Wrecking Tool.

The wrecking tool is made from a piece of hexagonal iron rod three-fourths inches in diameter, 34 inches long. The bending must be done by heating and the ends are forged to the required dimension. Care should be taken not to heat too hot.

4. Porch Box Support.

This is a simple problem in bending and riveting. Strap iron $\frac{1}{8}$"x1" is satisfactory material and 3/16" rivets are used. Specific dimensions are not suggested because each set of supports must be designed to fit the particular spot where it is to be used.

FIFTEENTH MEETING OF NATIONAL VOCATIONAL SOCIETY.

The fifteenth annual meeting of the National Society for Vocational Education will be held January 5, 6, and 7, 1922, at Kansas City, Mo. The meeting promises to be one of the largest and most helpful in the history of the organization and the program is expected to attract many people representing the industries and business and commercial houses. The program offers the following topics and speakers:

Agricultural Section: W. F. Lusk, Mississippi Agricultural College, Chairman. Occupational analysis and courses of study in agriculture; Reaching the boy on the farm; The project method in agriculture; Farm mechanics and farm management; Responsibilities of parent in training the son as an agriculturist.

Commercial Education: F. G. Nichols, state director of commercial education for Pennsylvania, Chairman. Retailing education in schools and department stores; Business training in the full-time, cooperative, part-time and evening schools; Supervision and direction of commercial education; Preliminary report on a nation-wide survey of senior commercial occupations.

Industrial Education: Benj. W. Johnson, Supervisor of Trade and Industrial Classes, University of California, Chairman. Cooperative part-time education; Evening trade extension classes for persons engaged in industry; The problem of industrial education in the small community; Industrial courses in the compulsory continuation school; Relation of Industrial Education to apprentice training.

Training in Industry: Mr. C. R. Allen, Federal Board for Vocational Education, Washington, D. C., Chairman. Foreman training; Training in Production Work; Training of women in industry; Apprentice training; Up-grading of workers in service.

Vocational Home Making: Miss Louise Stanley, Head of the Division of Home Economics, University of Missouri, Chairman. Promotion of home economics instruction for adults; Home economics education in compulsory part-time schools; Job Analysis and courses of study for home occupations; Responsibility for the home in training home makers.

Part-Time Education: Mr. George P. Hambrecht, State Director of Vocational Education for Wisconsin, Chairman. The development of part-time education in the 22 states; The Development of voluntary part-time courses; Vocational guidance and its relation to working children; Attitude of employers toward compulsory part-time education.

Teacher-Training: Mr. George E. Myers, Professor of Vocational Education, University of Michigan, Chairman. The training of teachers in service; Job Analysis in teacher training.

Industrial Rehabilitation: Mr. R. M. Little, State Director for Industrial Rehabilitation for New York State, Chairman. The relation of industrial rehabilitation to Medical service, compensation and safety first; Developments in the field of industrial rehabilitation; Methods of re-training physically handicapped persons.

MANUAL ARTS AND VOCATIONAL TEACHERS MEET.

The Manual Arts and Industrial Education Section of the Michigan State Teachers' Association, held a very interesting meeting on Friday, October 28th. Mr. Percy Angove, Chairman of the department, presided and Mr. Charles A. Wardner acted as secretary. Two hundred and fifty persons were in attendance.

Dr. G. A. Myers of Ann Arbor opened the meeting with an address on Vocational Guidance Through the Part-Time School. He showed that the control of this school, which continues until children are 17 years of age, offers a most excellent opportunity for placement and follow-up work. Close cooperation with any existing department of Vocational Guidance should be maintained and if none exist in a community, some one teacher should be responsible for the work. Each teacher in the school should be in part responsible for the success of the work and should be familiar with local industrial conditions and opportunities.

The second speaker, K. G. Smith, State Supervisor of Industrial Education, outlined the requirements for teachers engaged in the field of industrial education, in order to qualify for state and federal approval. An appreciation of the social and economic background of a community is one of the rare but important qualities of a teacher. Mr. Smith ended by declaring that all teachers must be progressive and must constantly strive to improve, so that they may rise in their rating. Mr. Smith showed by aid of a chart, the requirements for rating teachers A, B or C Grade.

GEORGE F. HATCH,
President Vocational Education Society,
Boston, Mass.

Household Mechanics and Manual Training was the topic of Mr. Earl L. Bedell of Northwestern High School, Detroit. Mr. Bedell is a pioneer in teaching household mechanics and with Mr. J. H. Trybom has developed the work to a high point of efficiency. Mr. Bedell stated that the chief difference in household mechanics and manual training is that the latter can be carried home under the student's arm, while the project of the former is carried home in the student's head. He pointed out that household mechanics appeals to school boards and taxpayers, because of the low cost of equipment and material. It is well known that manual training is by far the most expensive subject in the curriculum.

The next speaker was Miss Nellie M. Clark of the Part Time School, Detroit. She presented a resume of part time school work for girls in Detroit.

The final speaker of the morning was Dr. I. F. Filbey, of the University of Chicago, who discussed Vocational Guidance in the Intermediate School and showed how important guidance is during this transitional period.

At the close of the addresses, a brief business meeting was held. Mr. Earl L. Bedell of the Northwestern High School, Detroit, was elected chairman for the ensuing year and was authorized to select a woman as secretary.—**Chas. A. Wardner.**

VOCATIONAL EDUCATION SOCIETY OF BOSTON.

NOVEMBER MEETING.

The November meeting of the Vocational Education Society of Boston was held Saturday, November 19th, at Hotel Avery. Following luncheon a short business meeting was held. After this Assistant Supt. John C. Brodhead of the Boston Public Schools gave a short talk on the life of the late Superintendent Frank V. Thompson, saying that public education in the United States lost one of its ablest leaders in the death of Mr. Thompson.

The principal speaker was Royal Bailey Farnum, Massachusetts State Director of Art Education and Principal of the Massachusetts Normal Art School. He spoke on "Art Education in Massachusetts." He said that the public was demanding more artistic and more beautiful products in home furnishings, in clothing, and in building construction, and that it was manifestly the duty of the public schools to foster and encourage the appreciation of the beautiful. He declared that the aim of art education

should be: First, to develop taste; second, to develop artistic expression; and third, to train vocationally for industry. He expressed the earnest hope that art education in this country would be developed to the extent that we would build to bequeath to future generations all that is beautiful in life.

GOOD MEETINGS AT MINNEAPOLIS.

The programs of the Department of Industrial and Household Arts of the Minnesota Educational Association meeting, November 2-5, were of high quality and called out record attendances. Seven meetings were held.

Departmental Session.

At the general session on Thursday afternoon there were three speakers from without the State. Miss Anna E. Richardson, chief home economics education, Federal Board for Vocational Education, discussed the "problems" which confront those who enjoy her leadership. She commended efforts already made for girls in day schools and showed the necessity to push the work in part-time and evening classes, employed women constituting the great untouched field. Miss Richardson recommended a close study of the means used by university extension departments to get and to hold students.

Mr. Clyde A. Bowman, director industrial-arts department, Stout Institute, Menomonie, Wisconsin, presented, "Our Aims and Standards in Industrial and Vocational Schools." Mr. Bowman said that our success depends upon training teachers who can focus their efforts upon the needs of specialized groups. Teachers must be trained to analyze needs, to select materials fitting definite circumstances, and to present these materials by appropriate methods.

Mr. E. K. Wickman, Institute for Juvenile Research, Chicago, presented results of studies in comparison of mental and verbal intelligences. His chief contention was that it is not so much a matter of difference in ability as of amount. His discussion was direct and excited more after thought, perhaps, than any paper of the week.

Divisional Meetings.

The sectional meetings on Friday morning were most helpful. Space does not permit of more than mere mention of the names of speakers and addresses. The writer, however, must record his appreciation of the thoroughness with which each made preparation to use his limited time. Charts were exhibited by some and several passed out outlines and illustrative material which gave concreteness to the presentations and afforded good bases for discussion and for further study at home. Slides were used in some instances. All of these practices we strongly endorse.

Agriculture, two sessions, H. J. Olin, Rochester, Chairman.

Spraying, R. S. Mackintosh; New Fruits for Minnesota, W. H. Alderman; Irrigation for Truck Crops to Grow, W. T. Tappley; Ornamental Plants for Home and School Grounds (Illustrated), LeRoy Cady; Feeding, Care, and Management of the Pig Club Litter, Evan Farrin; Feeding, Care, and Management of Baby Beef, J. S. Montgomery; Club Work, T. A. Erickson; Developing a Livestock Judging Team, Paul Calrow; The Animal Husbandry Course Including Laboratory Exercises for One Year, A. M. Field; Shopwork Course for Smith-Hughes Schools (Illustrated), L. F. Knowles.

Address, Professor A. V. Storm, Chief of Division of Agricultural Education, University of Minnesota.

Manual Training, J. E. Painter, Minneapolis, Chairman.

An Analysis of the Industrial Teachers' Job, Roy L. Southworth; How To Test Results of Our Class Work, George K. Wells; Manual Arts Objectives, Means and Methods, Clyde L. Bowman.

Household Arts, Miss Frances R. Kelley, Minneapolis, Chairman.

Education of Girls for their Home and Civic Responsibilities, Mrs. W. W. Remington; Selling Home Economics Education to the People of Minnesota, John S. Taylor; Recent Knowledge in Nutrition, Katherine Blunt.

Drawing and Design, Miss Nama Lathe, Minneapolis, Chairman.

The Place of Art in Community Activities, John Lovejoy Elliott; Where Inspiration Waits—Review and Anticipation, Miss Ruth Raymond; Open Symposium—Specific Examples—Minnesota Teachers.

Music, George Krieger, Minneapolis, Chairman.

Some Suggestions in Teaching Brass and Reed Instruments in Grades and High School, C. W. Klingman; The Natural Development of Boys' Voices, Miss Adele P. Lien; Boys' Glee Clubs in the Grade School—The Need and the Difficulty of Organization, Miss Laura W. Angell; Voice Testing in the High School, Why? Miss Gladys Latterell.

Boys' Glee Clubs in the High School—Changed and Unchanged Voices, H. E. Griebenow; Music in the School, P. W. Hutson; Address—Stanley R. Avery, President Minneapolis Music Teachers' Association.

—**Homer J. Smith**, University of Minnesota.

SECOND MEETING OF INDUSTRIAL TEACHERS OF OKLAHOMA.

The second annual Conference of the Industrial Education Division of the Oklahoma Educational Association was held November 4-5, at Tulsa.

The principal speaker at the conference was Mr. R. W. Selvidge, Professor of Industrial Education at the University of Missouri, who spoke on "Definite Aims for Manual Training," "Teaching Trades as Manual Training," and "Courses of Study and Their Uses." The conference was much interested in the talk by Mr. O. B. Badger, Director of Industrial Education of Wichita, Kans., who discussed the subject "Types of Shop Courses Needed." He also reported on the present and future shop courses for the Wichita schools.

The conference accepted the report of the Committee on Certification of Manual Training Teachers with a few changes. Mr. Selvidge who has made a study of the question, declared that this was the most advanced step taken in this direction by any state.

The conference reelected the following officers: President, DeWitt Hunt, Director of Shop Practice, Oklahoma A. and M. College; Vice-President, Harry W. McKimmey, Oklahoma City High School; Secretary-Treasurer, Hugh Norris, Director of Manual Arts, Oklahoma Central Normal School.—**M. E. Franklin.**

WISCONSIN TEACHERS MEET.

The Manual Arts Section of the Wisconsin Teachers' Association met on November 3rd to hear addresses on "The Present Condition of Manual Training in the State," by Hans W. Schmidt, State Supervisor; on "The Correlation of Drawing and Benchwork in the Grades," by H. H. Whitney of Oshkosh, and on "The Opportunities for Advancement in the Manual Arts and Industrial Education Field," by Ira S. Griffith, of the University of Wisconsin.

The vocational teachers held a largely attended meeting at which Mr. George P. Hambrecht discussed the rehabilitation of cripples. Mr. W. P. McNeal spoke on "Home Making."

NEW BOOKS.

Employee Training.

By John Van Liew Morris, Ph. D. Cloth, 311 pages. McGraw-Hill Co., New York, N. Y.

This book is descriptive in large part and gives the reader in brief, accurate form the essential facts of the employee training programs of the large industrial corporations of the United States. The author divides the types of training into four distinct classes: (1) comprehensive programs for apprenticeship and special training; (2) programs emphasizing apprenticeship; (3) programs of limited special training; and (4) programs of technical training. Under each head he describes the specific programs and methods used by typical concerns in the several great lines of industry.

The book will, we think, create a better understanding and appreciation, on the part of schoolmen, of the growing efficiency and importance of shop classes and corporation schools.

Automotive Repair.

By J. C. Wright. Cloth, 530 pages, illustrated. John Wiley & Sons, New York.

With popular use of the power vehicles there are also coming into use books which deal with their construction and repair. The present volume is an exemplification of a class of literature which will come more and more into demand.

The man who owns and operates an automobile should know something of its construction and how to make minor repairs, or if he does not make them himself to know their extent and importance. But, the repair man, namely the man who specializes in bringing disabled cars into service with a minimum of delay and expense, has come upon the scene. His function is an important one and he should be well equipped to meet the demands made upon him.

This volume is arranged in the form of a textbook, is well illustrated, and covers every phase of automobile construction and repair.

Art and Education in Wood Turning.

By Wm. W. Klinke. Cloth, octavo, 110 pages. Price, $1.40. The Manual Arts Press, Peoria, Ill.

The author is both artist and craftsman. He presents here a course of instruction in wood turning in which not only correct methods of procedure in turning, in the use and care of machinery and tools, and in finishing turned products are insisted upon, but in which also beauty of line and mass are constantly aimed at. The book is intended primarily for high school classes in which the aim is cultural rather than vocational. Some of the processes are accordingly not those of the commercial turner or patternmaker, but rather of the older craftsman. The problems are useful and artistic. They have been limited to those which appeal most largely to boys and which are of value for use in furnishing the home.

The book gives no suggestion of advanced forms of turning such as spiral, oval or square work.

Games and Play.

Mel Sheppard and Anna Vaughn. Paper, small, 48 pages. Price, 25 cents. Community Service, New York.

This book offers a carefully graded series of games and play for school and social center work. The chief value of the compilation lies in the fact that the games have been actually used under normal school conditions.

Details of Cabinet Construction.

The Woodworker Series. Cloth, Octavo, 203 pages. J. B. Lippincott Co., Philadelphia.

A group of British craftsmen and teachers have combined to present in this book the approved English methods of constructing furniture from the simplest forms of chairs and tables to the complicated types of cabinets. The making of doors, drawers, the fitting of cornices, mouldings, hardware, the work of inlaying, veneering, etc., in a word all the processes of cabinet work are taken up in special chapters. The book is fully illustrated.

NEWS AND NOTES FROM THE FIELD.

"Less than one per cent of the workers in agriculture, mining and manufacture have received proper training for their work," recently said Major William T. Morgan, formerly of the educational division of the war department. "Out of 250,000 candidates who presented themselves as skilled mechanics only 30 per cent had any real knowledge of their supposed trade."

The vocational schools of Pennsylvania have grown in eight years from five departments of agriculture to 112 centers of vocational agriculture; 83 centers of home-making instruction to 130 enters for vocational industrial education.

A vocational conference recently held at the William Hood Dunwoody Institute, Minneapolis, gave some consideration to the training of foremen. It was held that the foreman is the go-between between the management and the operators of an industrial plant, hence industrial peace and the production efficiency of the plant depend upon him. He must conserve the resources of the plant and the time of the men. The training of foremen who know how to deal fairly between employer and employe is deemed important.

Commercial Production. The New Britain, Conn., Trade School has recently added courses in masonry and carpentry. Both are being carried out on the production basis, with commercial jobs undertaken outside of the school building. The trade school has reported a fourth annual increase of thirty per cent in enrollment. It is planned to begin the construction of a new building to cost about $100,000.

Increased Attendance. The schools of Somerville, Mass., opened with an increased attendance in the Boys' Vocational School, the Manual Arts Department and the Junior and Senior High Schools. Sixty former service men are at present in training at the Boys' Vocational School in carpentry, cabinet work, pattern making, machine shop practice, tool making, drafting and automobile mechanics. At the continuation school conference, held the past summer at Hyannis, Mass., a class in blackboard sketching was graduated. Mr. Harry L. Jones, principal of the Boys' Vocational School, had charge of the class.

SCHOOL CRAFTS CLUB MEETING.

The November meeting of the School Crafts Club was held November 19th at the Stratford Hotel, New York City.

The meeting was opened by the chairman, Mr. Martin Corcoran of Elizabeth, N. J., and supported by the other new officers, Vice-Pres. Philip M. Wagner of Newark, N. J., Treasurer Edwin F. Judd of Upper Montclair, N. J., and Secretary Frederick C. Arnold of New York City.

The Program Committee did excellent work in arranging the most pleasing and successful meeting, which was marked by a record attendance. They were indeed fortunate in securing Mr. Wesley O'Leary, Assistant Commissioner of Education of New Jersey, who spoke on the Trend of Industrial Arts from the viewpoint of the State Department. Also Mr. C. Emmons, Superintendent of Schools, Elizabeth, N. J., who presented the City Administration's View of Industrial Arts.

The Club, very reluctantly accepted the resignation of Mr. Merritt W. Haynes, who has gone to Indianapolis to assist Director Hawkins in educational work.

RESULTS OF BIRD HOUSE CONTEST HELD AT PORTAGE, WIS.

This group of bird houses was made by sixth, seventh and eighth grade pupils of Mr. R. M. Naset, instructor of Manual Arts, Portage, Wis. The houses were judged by three citizens on the basis of practicability for the birds and neatness and correct construction. Four prizes were given for the best productions of each grade. The houses were all made of old box lumber and of other waste material which the boys picked up.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Paint and Varnish Remover.

239. Q:—Can you tell us how to make a good paint remover, also a shellac remover. Something that will not change the color of the wood.—I. G.

A:—For ordinary use, a non-patent-infringing varnish remover or paint remover may be made from equal parts of denatured alcohol, benzol and solvent naptha. If this evaporates a little too fast, I find that a small portion of turpentine or high-boiling-point naptha will produce the desired result. Denatured alcohol, wood alcohol, Columbia spirits or grain alcohol, will easily remove shellac as will also the remover noted above.

The type of stain which has been used underneath the varnish, will alone determine the possibility of changing the color of the wood through the use of a remover. If the stain was a water soluble material, the color will not be affected; if spirit or oil soluble it will in part be removed as anything which will dissolve the varnishes or shellacs of the finish will also dissolve oil and spirit soluble colors. —Ralph G. Waring.

Mahogany Finish on Poplar.

242. Q:—We are making some music cabinets out of poplar, some white and some yellow. Please tell me what to use to finish them mahogany. Some are to be light and some dark. We would like to have a hard finish, if possible.—E. H.

A:—A good stain for mahogany finish on poplar may be made from two ounces of Bismark brown aniline, boiled in one gallon of vinegar. This must be made in a graniteware basin, as tin containers will be attacked both by the color and the acid. This will make a very strong red stock solution. For browner tones make up another solution of bichromate of potash, four ounces per gallon of hot water. By using definite proportions of these two solutions, any shade of brown mahogany may be made within certain limits. Should this not be dark enough, small amounts of water soluble black will give the desired shade. This should also be made up at the rate of four ounces of aniline per gallon of hot water. With stock solutions of this type at hand, a little experience will furnish enough evidence to enable any one to make up a wide range of fine colors, much more easily than is possible where it is attempted to dissolve given amounts of several anilines in a gallon of solution.

Because of its lack of pores, poplar need not be filled but should be sized with a wash coat of orange shellac, which has been very slightly tinted with Bismark brown in alcohol, applied directly over the thoroughly dried and unsanded stain coat. This sizing will drive the color into any whiskers or raised portions induced by the use of water stain and will enable the entire surface to be sanded glass smooth directly the shellac is hard and dry. The work should be carefully dusted off and a well brushed out coat of a good rubbing and polishing varnish applied. Allow to dry three days or more and then sand thoroughly with a split 00000 paper. This should be repeated for three or four coats, the last two having been rubbed out with felt pad, pumice stone and water and if desired, allowed to stand over night after the last rubbing and given a second polishing with a soft felt pad, rotten stone and water. Sponge off clean and finish off with a good polish. For dull effects, the last rubbing should be made with F pumice stone, felt pad and water.—Ralph G. Waring.

Snow Shoes.

245. Q:—Kindly advise where I may obtain information regarding the construction and lacing of snow shoes. —A. S.

A:—"Camp and Trail," by E. Kreps, published by the A. R. Harding Publishing Company, Columbus, Ohio. This book describes the various forms of snow shoes and gives complete directions for making and lacing them.

Furniture Ornaments.

250. Q:—How can imitation wood carvings be produced for furniture?—C. P. A.

A:—Ornaments in imitation of wood carvings can be bought from several firms, as follows: A. Steil Wood Turning Works, Grand Rapids, Mich.; Syracuse Ornamental Co., Syracuse, N. Y.; Spanjer Bros., Newark, N. J.; Samuel M. Charmer, Detroit, Mich.; Decorators' Supply Co., Chicago; J. B. Bernard Co., 422 E. 53rd St., New York.

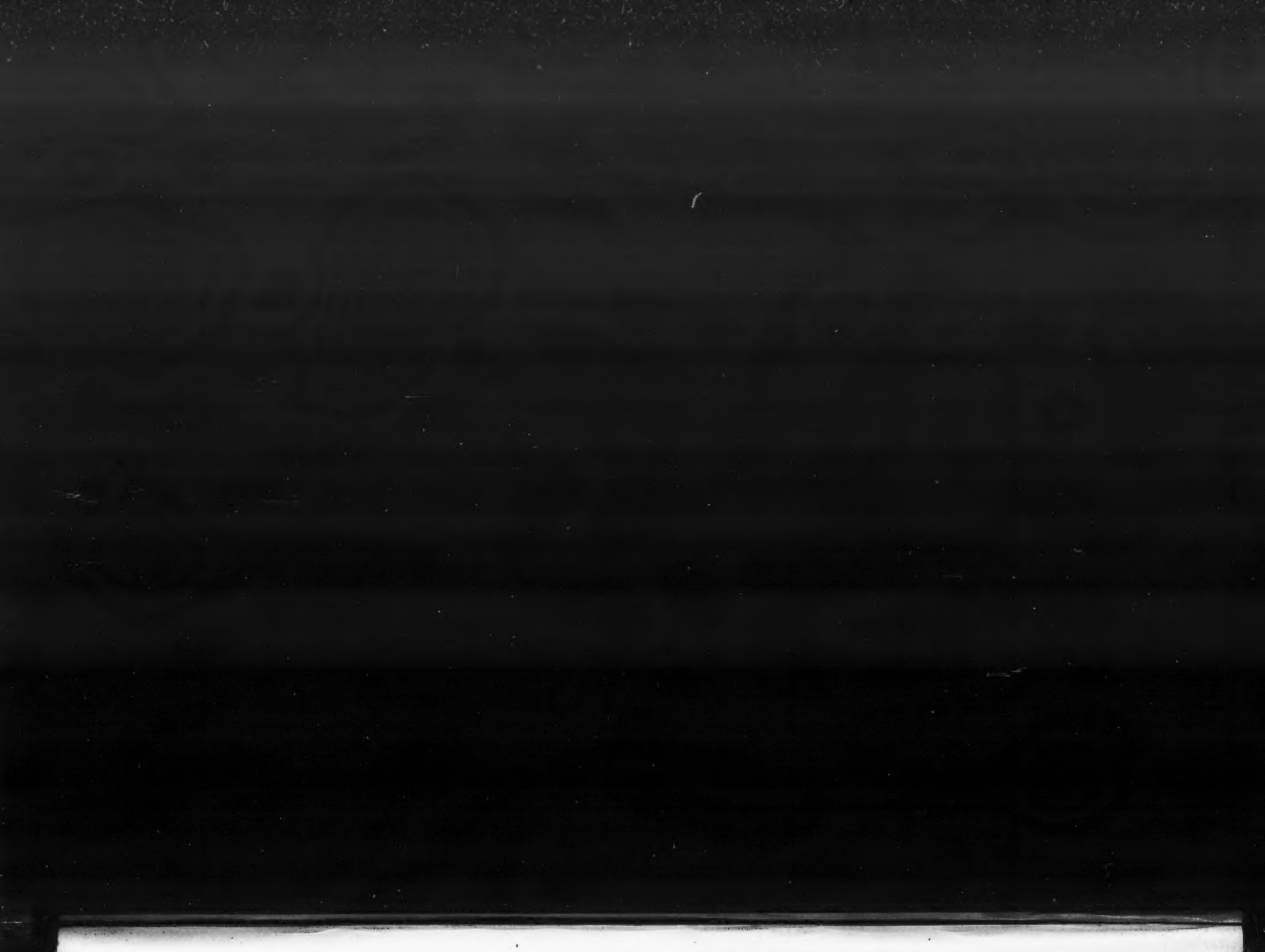
The ornaments may also be made by dissolving glue and adding to it moistened tissue paper. To this mixture should be added linseed oil and finally powdered chalk. The hot mass forms a dough and can be pressed into glue or plaster molds. When cold it is very hard and can be applied to wood with hot glue.

A White Lead Finish.

248. Q:—Can you supply us with the directions, or with a book containing them, for putting a white lead finish on to old or new furniture?—G. M. L.

A:—In preparing old or new furniture for an enamel finish the first necessary operation is to carefully sand the work entirely free from scratches or abrasions. In the case of new cabinet work, it is best to give the wood a well-brushed-out coat of ordinary varnish which offers a splendid foundation for the lead coats which are to follow. It is best at all times to avoid shellac as a sizing coat for lead, or enamel work, due to the fact that it offers little or no hold for the succeeding finish. Varnish, however, thoroughly satisfies the wood and prevents the absorption of the oil from the lead coats. Should this occur, there would be a strong tendency for the strong enamel coats to strip off the finish from the wood.

When the varnish coat has thoroughly dried, sand very smooth and glaze any indentations, nail holes, etc., with a putty made from one-third whiting and two-thirds white lead in oil. Keep this fairly stiff but soft enough so as to cut clean with a putty knife. Allow such portions at least 48 hours, after which sand smooth and reglaze, if necessary. Any of the better class flat-drying oil paints of the socalled inside type, can be used for the lead work, although white lead in oil reduced at the rate of sixteen pounds per gallon of turpentine, will make a fine material. It does not, however, sand as smooth or hard as the so-called "undercoaters" prepared by reputable companies, and in addition it has the objection of white lead dust, considered by many quite unhealthy.

All lead coats should dry at least two days and should be thoroughly sanded between coats with a split 00 paper. This part of the finish can be built up to any desired smoothness and should be followed with a final finish of B. & L. Vitralite enamel, preferably gloss stock. This may be tinted with tube colors, ground in japan only; oil colors having a marked tendency to slow up the drying of the enamel. Each coat of enamel should dry at least one week and should be rubbed between coats with felt pad, FF pumice stone and water.

The most desirable brush for the class of work is a Fitch varnish flowing type, chisel pattern of the proper width. The last coat may be left in the gloss or rubbed as desired.—Ralph G. Waring.